To: Loring, Joseph B CAPT[Joseph.B.Loring@uscg.mil]; david.moore@bsee.gov[david.moore@bsee.gov]; kurt.a.hansen@uscg.mil[kurt.a.hansen@uscg.mil]; Jenkins, Shannon R CIV[Shannon.R.Jenkins@uscg.mil]; Lundgren, Scott[Scott.R.Lundgren@uscg.mil]; Vocke, William CIV[William.T.Vocke@uscg.mil]; Platt, Jeffrey R LT[Jeffrey.R.Platt@uscg.mil]; Conmy, Robyn[Conmy.Robyn@epa.gov]; Wilson, Gregory[Wilson.Gregory@epa.gov]; Principe, Vanessa[Principe.Vanessa@epa.gov]; wayne.yoder@dhs.gov[wayne.yoder@dhs.gov]; christina_kravitz@fws.gov[christina_kravitz@fws.gov]; daniel.yuska@dot.gov[daniel.yuska@dot.gov]; michael.carter@dot.gov[michael.carter@dot.gov]; michael.j.green-1@nasa.gov[michael.j.green-1@nasa.gov]; Kemp.skudin@navy.mil[Kemp.skudin@navy.mil]; Stephanie A. Brown[stephanie.a.brown@navy.mil]; steve.lehmann@noaa.gov[steve.lehmann@noaa.gov]; robert.w.smith@dot.gov[robert.w.smith@dot.gov]; Steven.V.Cary@usace.army.mil[Steven.V.Cary@usace.army.mil]; jfarrell@arctic.gov[jfarrell@arctic.gov]; Andrew.J.Bruzewicz@usace.army.mil[Andrew.J.Bruzewicz@usace.army.mil]; Elena.Melchert@hq.doe.gov[Elena.Melchert@hq.doe.gov]; Lori.Medley@bsee.gov[Lori.Medley@bsee.gov]; kevin.easley@hq.doe.gov[kevin.easley@hq.doe.gov]; debbie.payton@noaa.gov[debbie.payton@noaa.gov]; Jeff.Ji@boem.gov[Jeff.Ji@boem.gov]; Walter.Johnson@boem.gov[Walter.Johnson@boem.gov]; jason.boehm@nist.gov[jason.boehm@nist.gov]; john.kucklick@nist.gov[john.kucklick@nist.gov]; john.kucklick@noaa.gov[john.kucklick@noaa.gov]; robb.hyde@navy.mil[robb.hyde@navy.mil]; steven.pearson@bsee.gov[steven.pearson@bsee.gov]; Abe.nachabe@navy.mil[Abe.nachabe@navy.mil]; dave.westerholm@noaa.gov[dave.westerholm@noaa.gov]; Weaver, James (USCG)[James.D.Weaver@uscg.mil]; Erica.Folio@Hq.Doe.Gov[Erica.Folio@Hq.Doe.Gov]; barry_Forsythe@fws.gov[barry_Forsythe@fws.gov]; David.Lehman@dot.gov[David.Lehman@dot.gov]; frank.stone@navy.mil[frank.stone@navy.mil]; rachel.hardey.ctr@navy.mil[rachel.hardey.ctr@navy.mil]; Crecy, Stacey L LCDR[Stacey.L.Crecy@uscg.mil]; Carnegie, Tammie R LT[Tammie.R.Carnegie@uscg.mil]; Turner, Arden C CIV[Arden.C.Turner@uscg.mil]; mark.g.vanhaverbeke@uscg.mil[mark.g.vanhaverbeke@uscg.mil]; Balsley, Alexander CIV[Alexander.Balsley@uscg.mil]; Fletcher, James E CIV[James.E.Fletcher@uscg.mil]; mfocazio@usgs.gov[mfocazio@usgs.gov]; DiRenzo, Joseph CIV[Joseph.DiRenzo@uscg.mil]; Hall, Gregory CDR (EDU)[Gregory.Hall@USCGA.EDU]
From: Vocke, William CIV
Sent: Wed 5/13/2015 5:16:26 PM
Subject: ICCOPR R&T Plan Chapters 7 , 8, and 9 for review
Ch 7&8 Member Draft 2015-05-13.docx
Ch 9 - Member Early review 2015MAY13.docx

All,

Thank you for comments on chapters 2 through 6. Attached for your early review are chapters 7 (Noteworthy Oil Spills), 8 (Current State of Oil Pollution Knowledge), and 9 (Priorities). Please review these chapters and provide me with comments or edits by COB May 27, 2015.

I expect to send out the remaining chapter (1-Need for Oil Pollution Research) sometime next week. At that point, all chapters of the R&T Plan will be drafted and under review. I appreciate any input you have so I can address issues before we undergo formal review.

Bill Vocke
ICCOPR Executive Director
(202) 372-2019

To: Principe, Vanessa[Principe.Vanessa@epa.gov]
Cc: Debbie Payton - NOAA Federal[debbie.payton@noaa.gov]; James Rosenberg - NOAA Federal[James.E.Rosenberg@noaa.gov]; Wilson, Gregory[Wilson.Gregory@epa.gov]; Matthiessen, Craig[Matthiessen.Craig@epa.gov]
From: Jennifer Barre - NOAA Federal
Sent: Fri 7/17/2015 2:35:59 PM
Subject: NOAA Subpart J Comments
Subpart J - NOAA Final Comments.doc

Ms. Principe~

At the request of Ms. Payton, I am forwarding NOAA's comments on the proposed modifications to 40 CFR Part 300 Subpart J - use of Dispersants and Other Chemicals. Please let me know if there are any questions, comments or concerns.

Very Respectfully,

LTJG Jennifer L Barre
Emergency Response Program Coordinator
Emergency Response Division, Office of Response and Restoration
NOAA's Ocean Service
1305 East West Hwy, SSMC4-10137
Silver Spring, MD 20910-3278
301-909-8109 Cell

http://response.restoration.noaa.gov
Stay up to date with our Blog

Docket ID No. EPA–HQ– OPA–2006–0090

As the nation's experts on oceanic and atmospheric science and the lead science agency for coastal oil spills, The National Oceanic and Atmospheric Administration, Office of Response and Restoration (OR&R) has conducted a thorough scientific review of the proposed modifications to 40 CFR Part 300 *Subpart J - use of Dispersants and Other Chemicals*. This rule provides a National level standard for oil spill response operations and a framework for the scientific support provided by OR&R, and we will rely on its guidance as we provide our expertise in response.

EPA's proposed modifications are a much needed and welcomed change. When oil and chemical spills threaten our coasts, this proposed rule will provide valuable information to contingency planning stakeholders, first responders, and industrial partners to protect our environment, communities and economies. The proposed requirements will provide data to guide response decisions, building resilience by reducing impacts to ocean ecosystems, limiting human exposure, and expediting remediation. At the same time, this rule preserves the use of dispersants and other chemicals as invaluable tools while establishing modern national standards to ensure they are used in a safe and scientifically-informed manner.

However, EPA could provide even stronger support for response by revising this proposed rule to adjust the testing and monitoring requirements to allow for more representative data collection and technology growth. To further strengthen spill planning and response operations, OR&R offers the following comments on the proposed rule:

***§300.910(a)(1)*: Logistical factors, as a requirement for authorization for agent use should be removed.** Logistical factors will systematically be assessed when an agent's use is proposed. Logistical factors frequently change for reasons which are not controllable by the plan developers and maintenance of this portion of the plan would be an unnecessary burden.

Additionally, it is more specifically requested that the logistical factor "manufacturing capabilities of available agents" be removed, as this parameter is at the discretion of Industry entities. Industry has no obligation to provide their capabilities to the plan developers and their ability to manufacture may drastically change pending economic influences.

***§300.910(a)(2)*: Modify the language to read, "Withdraw of [Approval] means the …"**. The word concurrence is inconsistent with the "approve, disapprove" or "approve with modifications" language earlier in the paragraph. The term concurrence is used for consultation roles.

***§300.910(a)(2)*: The requirement for a 30 day notification to the NRT should be removed from of this rule.** Since, there is no requirement proposed for a 30 day notification to the NRT for initial concurrence, the need for a NRT notification following a withdrawal of concurrence is unclear.

***§300.910(a)(3)*: Either add an extension clause or remove the a 5 year review.** This timeline places a burden on RRT members and may make plans legally invalid. The need for reviews and updates is undebatable, however allocation of resources may not always allow for compliance with this timeline. It is vital that the OSC have all tools available for response operations.

***§300.913(b)*: Revise the language to clarify the intent of the requirement.** This section can be interpreted that every sample within the plume must be analyzed for all eleven items listed under this part; this would be arduous and restrictive. It may also been interpreted that a minimum of one sample must meet all of those requirements. This section should require that sampling be conducted within the dispersed oil plume to provide representative data. Suggested language: "In the dispersed oil plume, collect daily water column samples following guidelines agreed to by the FOSC for the incident. Plume sampling shall be representative and may include analyses for: …"

***§300.913(b)*: It is requested that the OSC be authorized to waive collection requirements due to safety, environmental, and operational considerations.** We are in support of the monitoring efforts proposed and all of the information requested is important. However, there may be conditions that prevent collecting all of the proposed data.

***§300.913(b)(2)*: The language should be changed to "in-situ monitoring for the presence of hydrocarbons targeted to the type of oil discharged and referenced against the source oil;"** The requirement for in-situ fluorometry and fluorescence signatures is a specific and therefore limiting requirement. Monitoring technologies are developing and the rule should allow for inclusion of any emerging technologies that can perform the same function.

***§300.913(c)*: Modify the language to, "In consultation with the OSC, and using [Special Monitoring of Applied Response Technologies guidance], characterize".** The best available technologies may be excessive monitoring, pending the scenario. The SMART protocol provides guidance to responders and allows for the OSC and the EU to determine what is necessary for the specific incident.

***§300.915*: In addition to the proposed submission requirements of the rule, manufacturers should be requested to provide supplemental data if available.** This additional data may provide decision makers with necessary information to make trade-off decisions.

***§300.915(a)(15)*: The National Water Quality Standards lowest acute value for aquatic life may not be appropriate for this use.** Concentrations in products may exceed the standard; however dilution to use ratios and then addition to the receiving waters will reduce the concentration by orders of magnitude. A calculated concentration in the receiving water following application would be a protective limitation. If a safety factor is necessary, the values

in the application concentration would be less limiting than the product concentrate. As the rule is written it may be beneficial for companies to dilute their product to application concentrations to comply with this rule. This would require more storage capacity and limit smaller companies from competing.

***§300.915(b)(1)(i-iv) and Appendix C*: A Gulf of Mexico oil should be a reference oil required in testing protocols.** It is recognized that the oils selected provide a broad range of data, however the GOM has been the location for the majority of historic use and is the most likely region for future applications. By including a Gulf of Mexico oil in this requirement, responders will have pertinent information for a common oil type most likely to be involved in an incident.

***§300.915(b)(1)(i-iv)*: The 5°C testing temperature should be replaced with 0°C.**
V.C.4.a.14.b.1. discusses that monitoring temperatures were selected to prepare for response operations from Arctic to tropical conditions. While 5°C is the winter temperature along most of the mid-Atlantic, New England, and Southern Alaska, Arctic temperatures are closer to 0°C. To prepare for response in the Arctic, these testing temperatures should include a temperature that is more representative of Arctic conditions.

***§300.915(b)(2)*: Oil-only tests with *Menidia beryllina* and *Americamysis bahia* should be monitoring requirements.** These tests demonstrate if a dispersant adds toxicity to the oil, by comparing the oil only LC50s to the dispersed oil mixture LC50s. This information assures that any product used in a response is not increasing the toxicity. This information can also be used as a data control measure for the results of dispersant/oil toxicity testing.
With heavier oils there may be considerable variability in the production of non-chemically dispersed oil water accommodated fractions (WAF). In the absence of a dispersant, these oils may or may not result in concentrations that are within a range for calculating LC50s and thus obfuscating the calculation of LC50 ratios.
An evaluation of existing NPS dispersant toxicity data found considerable variability among the vendor LC50 data in terms of both No.2 fuel oil and reference toxicant (DDS) data. For example, *Menidia beryllina* LC50s for No.2 fuel ranged from 6 to 200 ppm and the reference toxicant (DDS) ranged from 1 to 160 ppm. This amplifies the need for certification and QA/QC reviews of laboratories. The laboratories results of oil toxicity tests should be compared to oil only tests. This would then allow the EPA, industry, and stakeholders to place confidence in the dispersant/oil tests.

***§300.915(b)(2) and Appendix C to Part 300 3.0*: A moderately sensitive species should be selected for the Developmental Assay testing requirements.** The majority of literature on early life stages exposed to oil/dispersant mixtures indicate that the urchin is not a very sensitive species. As possible adverse effects of dispersants on the developmental processes of fish and invertebrate species is an issue of concern, a species that can provide representative toxicity information should be used.

***§300.915(d)*: Bioremediation agents that contain surfactants should be required to conduct the Baffled Flask Efficacy Test to determine if the agents have dispersing effects.** If it is determined that an agent passes the dispersant efficacy test, then the agent should be required to conduct the Dispersant Toxicity Test and to also be listed as a dispersant on the product schedule.

***§300.915(d)(1)*: Bioremediation agents should be required to degrade alkanes "or" aromatics.** Oil degrading organisms are highly specialized and each break down different components of oils. The requirement for agents to degrade both alkanes and aromatics limits the use of products that are specialized to focus on particular components; this may be particularly important as products are developed to degrade weathered oils. The paragraph should read "To be listed on the Schedule, a bioremediation agent must successfully degrade alkanes [or] aromatics …"

***§300.915(d)(4)*:** Most fertilizers include more than 50% inactive ingredients as binders and fillers. Is it the intent of this rule to require list of fertilizers that are complexed in inert materials?

***Appendix C to Part 300 2.6.1*: Untreated oil controls are needed for reference oils to demonstrate the effectiveness of oil dispersion in the Baffled Flask Test, in the absence of product addition.** Information derived from reference oils would be valuable to the OSC as a measure of how product application may enhance natural dispersion. This may be done by adding the monitoring requirement to the rule or EPA could conduct these studies on the reference oils at the prescribed temperatures and use this standard data for product effectiveness comparisons.

***Appendix C to Part 300 2.2*: The dispersant to oil ratio for the Baffled Flask Test should be changed to the 1:20 field application ratio or the 1:10 conservative ratio for consistency.** The dispersant to oil ratio proposed in the Baffled Flask Test is 1:25. This ratio is inconsistent with the typical field application ratio of 1:20 and the 1:10 conservative ratio used for toxicity testing.

***Appendix C to Part 300 2.11*:** We request that Subpart J cite Kaku, V., Boufadel, M., and Venosa, A. (2006) "Evaluation of Mixing Energy in Laboratory Flasks Used for Dispersant Effectiveness Testing." J.Environ.Eng., 132(1),93-101.

***Appendix C to Part 300 5.1*: This should read, "The manufacturer may test either one or both freshwater [and] saltwater, depending on the product's intended use."**

To: Wilson, Gregory[Wilson.Gregory@epa.gov]
From: Wilson, Gregory
Sent: Thur 7/30/2015 6:20:49 PM
Subject: Steve Lehmann email – 8/7/2012

From: Steve Lehmann <steve.lehmann@noaa.gov>
To: "Pond, Robert" <Robert.G.Pond@uscg.mil>,
Cc: Craig Matthiessen/DC/USEPA/US@EPA, Dana Tulis/DC/USEPA/US@EPA, Debbie Payton <debbie.payton@noaa.gov>, "Caplis, John CAPT" <John.R.Caplis@uscg.mil>, Mike Faulkner/DC/USEPA/US@EPA, "Tirrell, Rebecca" <Rebecca_Tirrell@sra.com>, "Macon, Rhianna LT" <Rhianna.N.Macon@uscg.mil>, Gregory Wilson/DC/USEPA/US@EPA, Kim Jennings/DC/USEPA/US@EPA, Vanessa Principe/DC/USEPA/US@EPA
Date: 08/07/2012 12:56 PM
Subject: Re: Dispersant Guidance Document Draft

Bob
Let me respond one-by-one

On Mon, Aug 6, 2012 at 7:31 AM, Pond, Robert <Robert.G.Pond@uscg.mil> wrote:

Steve et al.

On behalf of John Caplis, wanted to offer a few additional items for your consideration based on our review.

1. Recommend grouping monitoring requirements into categories by purpose to improve clarity. There appear to be 3 basic purposes for the recommended monitoring:
a. Effectiveness
b. Fate and transport
c. Assessment of ecological impact

This will require a complete reformat, unless you are simply suggesting re-titling the various monitoring methods. I'll see what I can do and get back to you with either ideas, alternates or compliance.

The monitoring discussion should parse out the techniques by primary outputs expected. Each grouping should include brief discussion of purpose and intent. This could be done either in both the subsurface and surface discussions or as an introduction to both.

2. Recommend locating the Ecotox discussions so that it is either included in both the subsurface and surface discussions if that is the intent, or so that it immediately follows and is grouped with monitoring techniques that apply to both.

Again, a grouping question. The eco-tox discussion is designed to be the same for both sub-guidances and any other sub-guidances that this umbrella guidance eventually supports.

3. It remains unclear why sediment monitoring is recommended in conjunction with subsea dispersion. It does not appear to provide useful incident specific information regarding items 1 a.-

c. above specific to the use of dispersants.
a. Intuitively, chemical dispersion would result in reduced sedimentation compared to naturally dispersed oil because the chemical dispersed oil droplets are smaller, more buoyant and slipperier
b. so chemically dispersed oil droplets are arguable less prone to sedimentation than non-chemically dispersed oils which droplets are larger, heavier and stickier.
c. Even if equally prone, what value is there in monitoring sedimentation during a spill event absent any tie to effectiveness, or effects.
d. If the concern is quantifying sedimentation in an underwater or subsea spill event to help account for the full oil budget shouldn't sedimentation monitoring be a standard practice regardless of whether dispersant is used and not one mandated.

We struggled with this for the same reasons, however, we left it in with a statement that makes it clear that such monitoring is optional and incident-specific

Sediment sampling and monitoring ***is not always necessary****; however, sediment sampling can be a means of gathering additional information on subsea dispersant effectiveness and oil transport by means of sedimentation.*

One of the loudest concerns we heard at DWH related to dispersants "sinking" the oil. In fact, there were (are) oiled sediments on the ocean floor (ref: impacts to deep ocean corals), but we don't have good data confirming that the cause was **not** dispersants. For the reasons stated above, it is likely from other sources (non-chemically dispersed oil, natural seeps, etc) but we are in the position of having to prove a negative. The guidance should not be in a position of having NOT considered sedimentation.

4. Volatile Organic Compound Monitoring. Thought this section would be removed or relocated elsewehere. VOC monitoring is a health and safety issue that should be available for employment in both surface and subsurface spill operations regardless of whether dispersants are used or not. Associating it directly with subsea dispersant may lead some to believe it is not necessary for use in other spill situations or that it is somehow more substantive in this circumstance.

True, we are not trying to take work from the Health & Safety people. Here again, we (NOAA) had a long discussion about this and the primary reason for collecting the data related to impacts on marine life

While this document does not specifically address worker safety, the data collected in this effort should be available to the OSC and trustees in order to assess overall exposure to birds, marine mammals, and reptiles, all of whom breathe at the air–water interface.

In addition (as stated in the introductory paragraph to the VOC section), much emphasis was out on VOC reduction as a justification for subsea dispersant use. There is no doubt in my mind that if we have a similar release, this justification will be thrown out in the first utterances by the RP.

I am happy to move it onto the same level as eco-tox, that of applying to the entire document not

just subsea, but I resist removing all mention of it.

Those are my initial thoughts on your comments. I am re-editing the document today and tomorrow (on leave for a few days after that). I'm hoping to get the next version out later next week and I'm trying to get it put together via email. As always, call if you want to discuss any of this in detail.

Steve

Look forward to working with you, EPA and BSEE to get this done and out to the field.

Best regards

Bob Pond
Senior Technical Advisor
Office of Marine Environmental Response
U.S. Coast Guard
2100 2nd St. SW Stop 7363
Washington DC 20593
202-372-2240
202-372-1921 (fax)
202-631-5647 (cell)

-----Original Message-----
From: Matthiessen.Craig@epamail.epa.gov [mailto:Matthiessen.Craig@epamail.epa.gov]
Sent: Friday, August 03, 2012 1:44 PM
To: Steve Lehmann
Cc: Dana Tulis; Debbie Payton; Caplis, John CAPT; Mike Faulkner; Tirrell, Rebecca; Macon, Rhianna LT; Pond, Robert; Gregory Wilson; Kim Jennings; Vanessa Principe
Subject: Re: Dispersant Guidance Document Draft

Hi, Steve;

Nice work on merging the subsea and prolonged surface guides into one and before the deadline!

Here are comments from Dana Tulis, Vanessa Principe, Greg Wilson and I. We're all out of the office over the next couple weeks and are happy to work with you on resolving issues, questions and concerns as soon as we get back and when you are ready.

I hope the redline/strikeout comes through properly. I can make a "clean" version if you need.

Best regards - Craig Matthiessen

From: Steve Lehmann <steve.lehmann@noaa.gov>
To: Dana Tulis/DC/USEPA/US@EPA, "Captain John. R. Caplis" <John.R.Caplis@uscg.mil>
Cc: Debbie Payton <debbie.payton@noaa.gov>, "Pond, Robert" <Robert.G.Pond@uscg.mil>, Craig Matthiessen/DC/USEPA/US@EPA, Mike Faulkner/DC/USEPA/US@EPA, "Tirrell, Rebecca" <Rebecca_Tirrell@sra.com>, "Macon, Rhianna LT" <Rhianna.N.Macon@uscg.mil>
Date: 06/28/2012 12:05 PM
Subject: Dispersant Guidance Document Draft

Dana and John,

There is an old axiom that goes: "there is no minute quite as productive as the LAST minute"

Attached please find the merged interim guidances for subsea and prolonged surface dispersant applications. I believe this format will be both useful to the RRTs and flexible enough to house future guidances. I am attaching both a PDF and Word version of the same document.

I want to recognize the hard work and quality input of both Rebecca Tirrell of SRA and LT Rhianna Macon of the US Coast Guard, who worked with me to blend and re-tool this document. In addition, of course, the labor and expertise of Bob Pond and his Subsea group and the work and valuable counsel of Greg Wilson.

Please let me know if you have changes to recommend. This document is a draft until finalized and approved by the NRT.

Respectfully,

Steve Lehmann
NRT Science & Technology Committee, Chairman

--
Stephen Lehmann
NOAA Scientific Support Coordinator
Emergency Response Division / Office of Response & Restoration 10 George St. Suite 220
Lowell, MA 01852-2293

Office: 978-654-6385
Fax: 978-654-6386
Mobile: 617-877-2806
Emergency (24/7): 206-526-4911

[attachment "Interim Guidance_Extraordinary Dispersant Monitoring_28June12.pdf" deleted by Craig Matthiessen/DC/USEPA/US] [attachment "Interim Guidance_Extraordinary Dispersant Monitoring_28June12.docx" deleted by Craig Matthiessen/DC/USEPA/US]

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Stephen Lehmann
NOAA Scientific Support Coordinator
Emergency Response Division / Office of Response & Restoration
10 George St. Suite 220
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To: Wilson, Gregory[Wilson.Gregory@epa.gov]
From: Wilson, Gregory
Sent: Thur 7/30/2015 6:22:51 PM
Subject: Steve Lehmann email attachment 8/24/2012
Comments back to EOM.docx
Interim Guidance_Extraordinary Dispersant Monitoring_28June12 - OEM.docx

From: Steve Lehmann <steve.lehmann@noaa.gov>
To: Craig Matthiessen/DC/USEPA/US@EPA,
Cc: Debbie Payton <debbie.payton@noaa.gov>, "Tirrell, Rebecca" <Rebecca_Tirrell@sra.com>, "Macon, Rhianna LT" <Rhianna.N.Macon@uscg.mil>, Gregory Wilson/DC/USEPA/US@EPA, Vanessa Principe/DC/USEPA/US@EPA
Date: 08/24/2012 04:23 PM
Subject: Re: Dispersant Guidance Document Draft

Craig, Greg and Vanessa,

I have finally had time to finish up reviewing and commenting on the edits you three submitted a couple of weeks ago. In addition, I have been editing the main document based on recommendations from you, USCG, BSEE and a couple of outside experts.

I am planning to be in DC on Sept. 11th and Rebecca and I want to pull a group together to tighten this document up and get it finished. We'll be looking at Sept. 10th or 12th.

In the meantime, attached is a response to most comments you submitted. Lots of good suggestions and critiques. We still have some negotiating left to do on some others.

I am always available to talk about this more and I am anxious to get it finished.

Steve

On Fri, Aug 3, 2012 at 1:43 PM, Craig Matthiessen <Matthiessen.Craig@epamail.epa.gov> wrote:

Hi, Steve;

Nice work on merging the subsea and prolonged surface guides into one and before the deadline!

Here are comments from Dana Tulis, Vanessa Principe, Greg Wilson and I. We're all out of the office over the next couple weeks and are happy to work with you on resolving issues, questions and concerns as soon as we get back and when you are ready.

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Best regards - Craig Matthiessen

From: Steve Lehmann <steve.lehmann@noaa.gov>

To: Dana Tulis/DC/USEPA/US@EPA, "Captain John. R. Caplis" <John.R.Caplis@uscg.mil>
Cc: Debbie Payton <debbie.payton@noaa.gov>, "Pond, Robert" <Robert.G.Pond@uscg.mil>, Craig Matthiessen/DC/USEPA/US@EPA, Mike Faulkner/DC/USEPA/US@EPA, "Tirrell, Rebecca" <Rebecca_Tirrell@sra.com>, "Macon, Rhianna LT" <Rhianna.N.Macon@uscg.mil>

Date: 06/28/2012 12:05 PM

Subject: Dispersant Guidance Document Draft

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Please let me know if you have changes to recommend. This document is a draft until finalized and approved by the NRT.

Respectfully,

Steve Lehmann
NRT Science & Technology Committee, Chairman

--
Stephen Lehmann
NOAA Scientific Support Coordinator
Emergency Response Division / Office of Response & Restoration
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[attachment "Interim Guidance_Extraordinary Dispersant Monitoring_28June12.pdf" deleted by Craig Matthiessen/DC/USEPA/US] [attachment "Interim Guidance_Extraordinary Dispersant Monitoring_28June12.docx" deleted by Craig Matthiessen/DC/USEPA/US]

--

Stephen Lehmann
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Emergency (24/7): 206-526-4911

(See attached file: Interim Guidance_Extraordinary Dispersant Monitoring_28June12 - OEM.docx)(See attached file: Comments back to EOM.docx)

To: DeHaven, Leigh[DeHaven.Leigh@epa.gov]; MarkW Howard[Howard.MarkW@epa.gov]; Ruhl, Christopher[Ruhl.Christopher@epa.gov]; Swackhammer, J-Troy[Swackhammer.J-Troy@epa.gov]
Cc: Craig Matthiessen[Matthiessen.Craig@epa.gov]; Robyn Conmy[Conmy.Robyn@epa.gov]; Principe, Vanessa[principe.vanessa@epa.gov]
From: Wilson, Gregory
Sent: Thur 7/23/2015 8:51:43 PM
Subject: FW: ICCOPR R&T Plan - DRAFT FOR MEMBER REVIEW
ICCOPR R&T Plan Draft for Members 23JULY2015 v1 line nmbr.docx
R&T Plan Comment Matrix 23JULY2015.xls

Please let us know if you have any comments ASAP.

-----Original Message-----
From: Vocke, William CIV [mailto:William.T.Vocke@uscg.mil]
Sent: Thursday, July 23, 2015 3:54 PM
To: Abe.nachabe@navy.mil; Andrew.J.Bruzewicz@usace.army.mil; Balsley, Alexander CIV; barry_Forsythe@fws.gov; Bowis, Meagan K LT; Carnegie, Tammie R LT; christina_kravitz@fws.gov; Conmy, Robyn; Crecy, Stacey L LCDR; daniel.yuska@dot.gov; dave.westerholm@noaa.gov; David.Lehman@dot.gov; david.moore@bsee.gov; debbie.payton@noaa.gov; DiRenzo, Joseph CIV; Elena.Melchert@hq.doe.gov; Erica.Folio@Hq.Doe.Gov; Fletcher, James E CIV; frank.stone@navy.mil; Hall, Gregory CDR (EDU); kurt.a.hansen@uscg.mil; holly_herod@fws.gov; jason.boehm@nist.gov; Jeff.Ji@boem.gov; Jenkins, Shannon R CIV; jfarrell@arctic.gov; john.kucklick@nist.gov; john.kucklick@noaa.gov; Kemp.skudin@navy.mil; kevin.easley@hq.doe.gov; Lori.Medley@bsee.gov; Loring, Joseph B CAPT; Lundgren, Scott; mfocazio@usgs.gov; michael.carter@dot.gov; michael.j.green-1@nasa.gov; Platt, Jeffrey R LT; Principe, Vanessa; rachel.hardey.ctr@navy.mil; robb.hyde@navy.mil; robert.w.smith@dot.gov; Scott Lundgren NOAA; Stephanie A. Brown; steve.lehmann@noaa.gov; steven.pearson@bsee.gov; Steven.V.Cary@usace.army.mil; Turner, Arden C CIV; mark.g.vanhaverbeke@uscg.mil; Vocke, William CIV; Walter.Johnson@boem.gov; wayne.yoder@dhs.gov; Weaver, James (USCG); Wilson, Gregory
Subject: ICCOPR R&T Plan - DRAFT FOR MEMBER REVIEW
Importance: High

All,

It is with great pleasure (and much relief!) that I am forwarding the completed Draft ICCOPR Research and Technology Plan for FY2015-2021 for member review. This version incorporates revisions to individual chapters based on multiple rounds of review for individual chapters. Please take time to review this completed document and provide me with comments using that attached comment matrix. Comments are due August 7, 2015 COB. Once comments are addressed from this round of review, I will send out a final version for ICCOPR vote on adopting this Plan.

If you identify any critical issues, please contact me ASAP so we can address it as soon as possible. After our multiple reviews I hope we have addressed any critical issues. I am available anytime to discuss any concerns or suggestions.

I would like to extend my thanks to all the members and former ICCOPR members that have worked hard to develop the plan and provide comments on the drafts. In particular, I would like to recognize the members of the R&T working group for the extensive work evaluating the more than 900 research needs and narrowing them down into our 150 priorities. Participants in the R&T working group included Lori Medley, Robyn Conmy, Steve Lehmann, Elena Melchert, CDR Eric Miller, LT Sara Thompson, and Bill Vocke, with the support of the University of New Hampshire.

Very respectively,
Bill Vocke
Executive Director
Interagency Coordinating Committee on Oil Pollution Research U.S. Coast Guard

(202) 372-2019

To: Craig Matthiessen[Matthiessen.Craig@epa.gov]
Cc: Principe, Vanessa[principe.vanessa@epa.gov]
From: Wilson, Gregory
Sent: Wed 7/8/2015 2:14:27 PM
Subject: FW: Milestone Update - Alternative Methods/SMART - 2015 OSC Academy
NCP_SG_presentation.ppt
OSC2011Orlando-Countermeasures_Venosa.ppt
SMART_Protocol_OSC_2011.ppt

See below

From: Eskelsen, Joann
Sent: Tuesday, July 07, 2015 12:54 PM
To: Gawarzewski, Joseph; DeHaven, Leigh; Wilson, Gregory; Sprenger, Mark; Humphrey, Alan
Subject: RE: Milestone Update - Alternative Methods/SMART - 2015 OSC Academy

Hi all, I will serve as your point of contact with the track development team, and will help in whatever way I can. I have attached presentations on SMART and countermeasures from the 2011 OSC readiness conference. Feel free to use these as a starting point.

At the moment the plans are for all of you to work on developing the module and for Mark Sprenger to present the module at the Academy, since he will be presenting a few other modules also.

I would suggest having a conference call in the next week or so to develop the agenda and outline, either Joe or myself can set up a call if you like.

Based on notes I took, the track development team would like you to address the following topics:

Bioremediation/landfarming

Burning (SMART)

Surface Washing Agents

Herders

Solidifiers

Coastal zone use of dispersants (SMART)

Selection guide/legal considerations/Subpart

Any other issues you think are appropriate.

We have a template for slides, which Joe attached to his e-mail. You don't need to worry about that right now, you can work on a blank template and Joe can format it later; but please take a look at it and follow the tips on pages 2 and 3 of the template.

Thanks

JoAnn M. Eskelsen
US EPA/ERT
4220 S. Maryland Parkway, Bldg. D, Suite 800
Las Vegas, NV 89119
702-784-8006
702-784-8001 (fax)
eskelsen.joann@epa.gov

From: Gawarzewski, Joseph [mailto:Joseph.Gawwarzewski@tetratech.com]
Sent: Tuesday, July 07, 2015 9:11 AM
To: Eskelsen, Joann; DeHaven, Leigh; Wilson, Gregory; Sprenger, Mark; Humphrey, Alan
Subject: Milestone Update - Alternative Methods/SMART - 2015 OSC Academy

Hi Everyone,

Thank you again for your involvement in the ***Alternative Methods/SMART*** course to be held as part of the Advanced Oil Response - Emergency Response track of the September 2015 OSC Academy.

I am the contractor support assigned to this course and I wanted to touch base with all initial members of

the development team. I realize I may not have the emails of all proposed team members; please feel free to forward to those that are not on this email.

•□□□□□□□□ The OSC Academy is planned for September 21 – 25, 2015.

•□□□□□□□□ The *Alternative Methods/SMART* module is scheduled to be 1.75 hours in duration.

Below are some milestones that are quickly approaching.

Milestones for *Alternative Methods/SMART* Presentation:

July 9, 2015 – Objectives and Outline due - *Please send to me any draft objectives and a rough outline for the course. We understand that it may change as the delivery approaches. This can be in paragraph or bulleted form. Also, if you have any additions or revisions to the proposed instructors, please let me know.*

July 31, 2015 – Draft Course Materials due – *These can be emailed directly to me or if they are large, we can go through an ftp site. It is key that we at least get powerpoints or videos that are planned to be used by this date. A powerpoint template for the course materials is attached to this email. Please see some helpful hints on Slide 3 of the template. You do not have to use this template, but it is there if you would like to use as you develop material.*

August 30, 2015 - Final electronic presentations due – *We are asking for the presentations to be submitted by this date so that we can test all presentations and ensure consistency in slides.*

If you have any questions or require further assistance, please contact Joe Gawarzewski at (302) 283-2290 or by e-mail at joseph.gawarzewski@tetratech.com

Thank you in advance for your help and time. I know the Objectives and Outline milestone is right around the corner. We ask that you do your best to submit by the end of this week or early next week.

If the development team determines that a series of conference calls are necessary leading up to the delivery, I can help coordinate.

Thanks,

Joe

Joseph Gawarzewski

Tetra Tech Inc.
240 Continental Drive, Suite 200
Newark, DE 19713

302.283.2290 office / 302.530.3871 cell

14th Annual OSC Readiness Training Program

2011 OSC Readiness Training

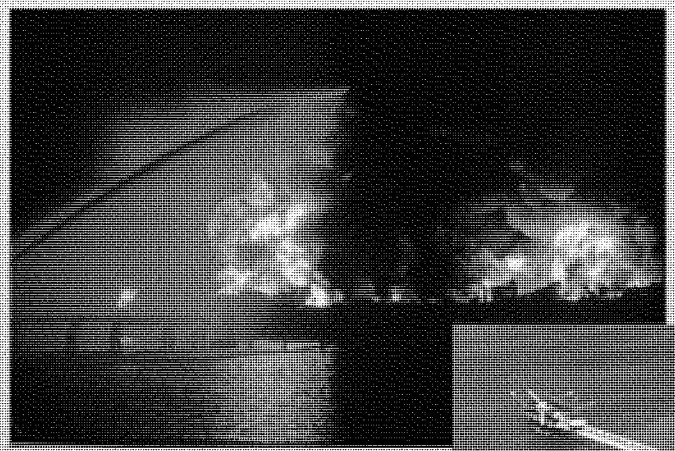
NCP Product Schedule / Selection Guide for Oil Spill Response Technologies / Alternative Response Tool Evaluation System for Oil Spill Response (ARTES)

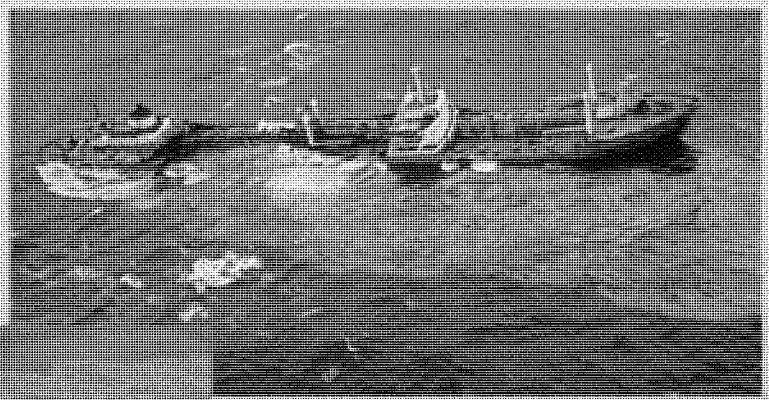
Training by OSCs for OSCs

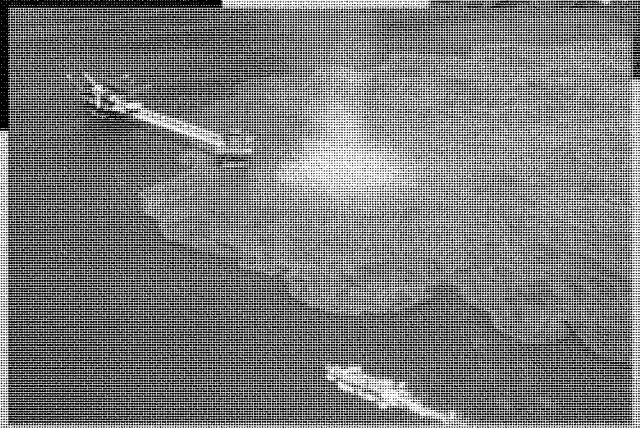
January 31 – February 4, 2011
Orlando, Florida
www.oscreadiness.org

History and Background

- Past spill experiences shapes our current decision-making about countermeasures e.g., *Torrey Canyon*, *Ixtoc I* blowout, *Exxon Valdez, etc.*





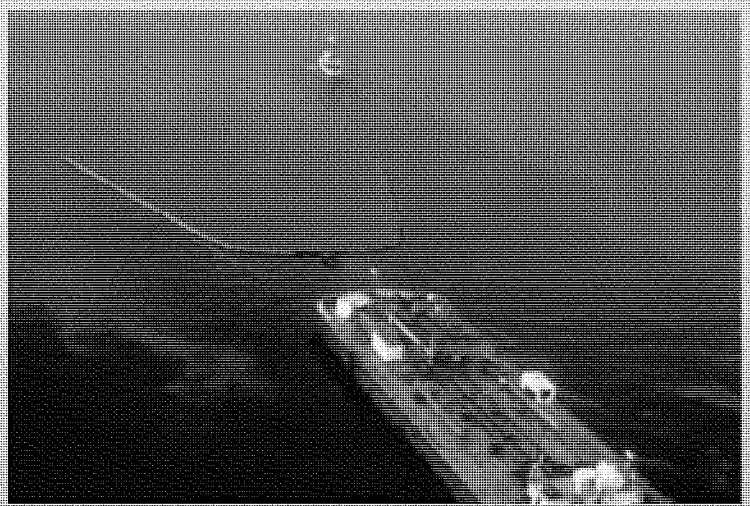


History, Cont.d

- Use of "non-traditional" response technologies (e.g., early dispersants) ⇒ perceived damages
- Their use resulted in changes in Federal regulations:
  - National Contingency Plan, and
  - the Oil Pollution Act of 1990

High Comfort Level

- Traditional countermeasures (boom, skimmer, sorbents etc.) are a known entity



Oil Spill Technologies, Defined

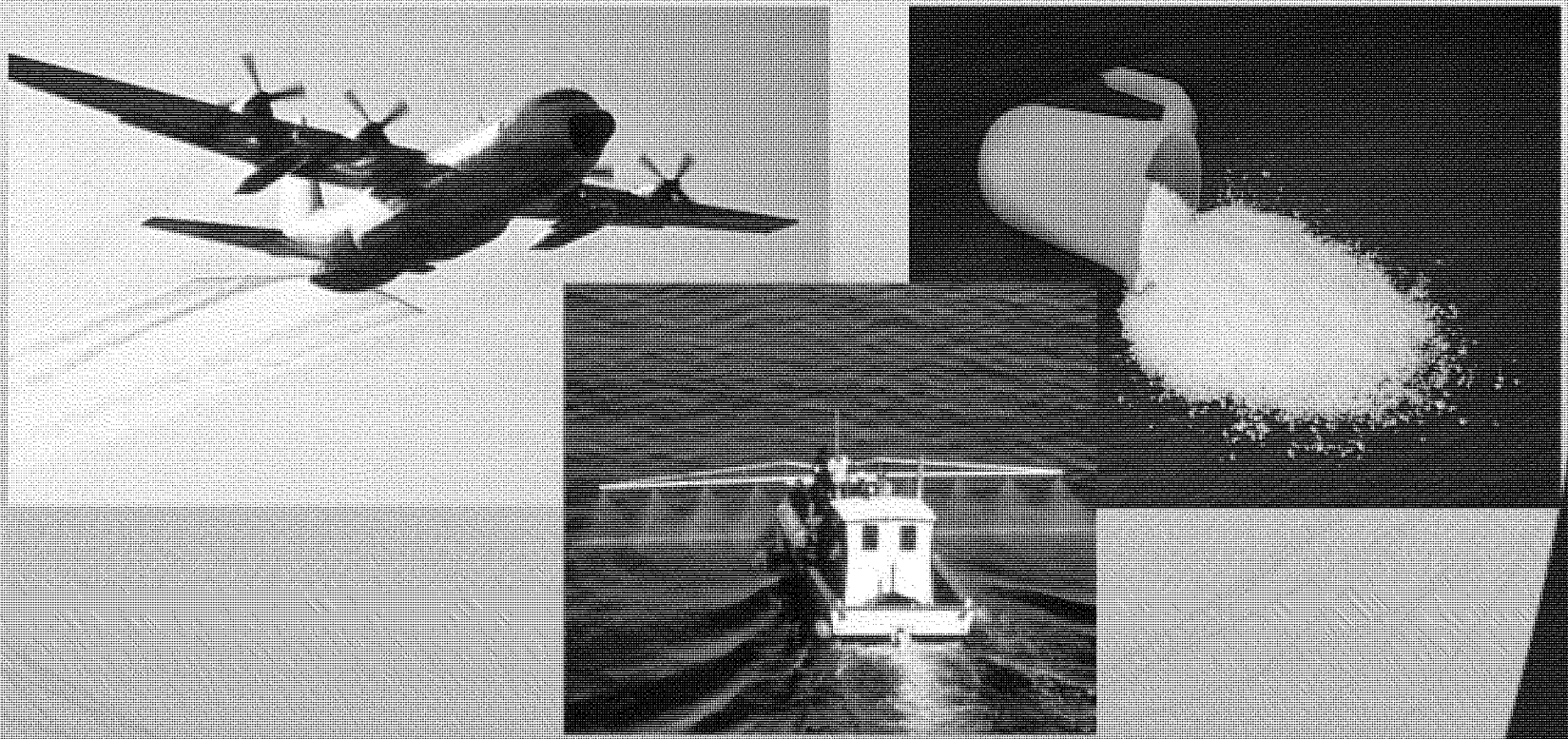
- a.k.a. – "non-traditional" regulated countermeasures
- Countermeasures that are infrequently used; limited experience / knowledge about when these countermeasures could be useful and environmentally beneficial

Oil Spill Technologies, Defined

- Includes:
  - Dispersants
  - Bioremediation Agents
  - Surface Washing Agents
  - Shoreline Pre-treatment Agents
  - Surface Collecting Agents
  - Solidifiers
  - Elasticity Modifiers
  - Emulsion Treating Agents
  - Other Miscellaneous Agents

Discomfort with Oil Spill Technologies

- Decision-maker's wary of non-traditional response technologies



Training by OSCs for OSCs

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Why?

- Lack of experience with the various products / strategies
- Perceived problems with their use:
  - Regulatory agency understanding?
  - Liability?
  - Result in additional environmental damage?
  - Lack of experienced application / recovery personnel
  - Difficult to interpret product information?
  - Vendors

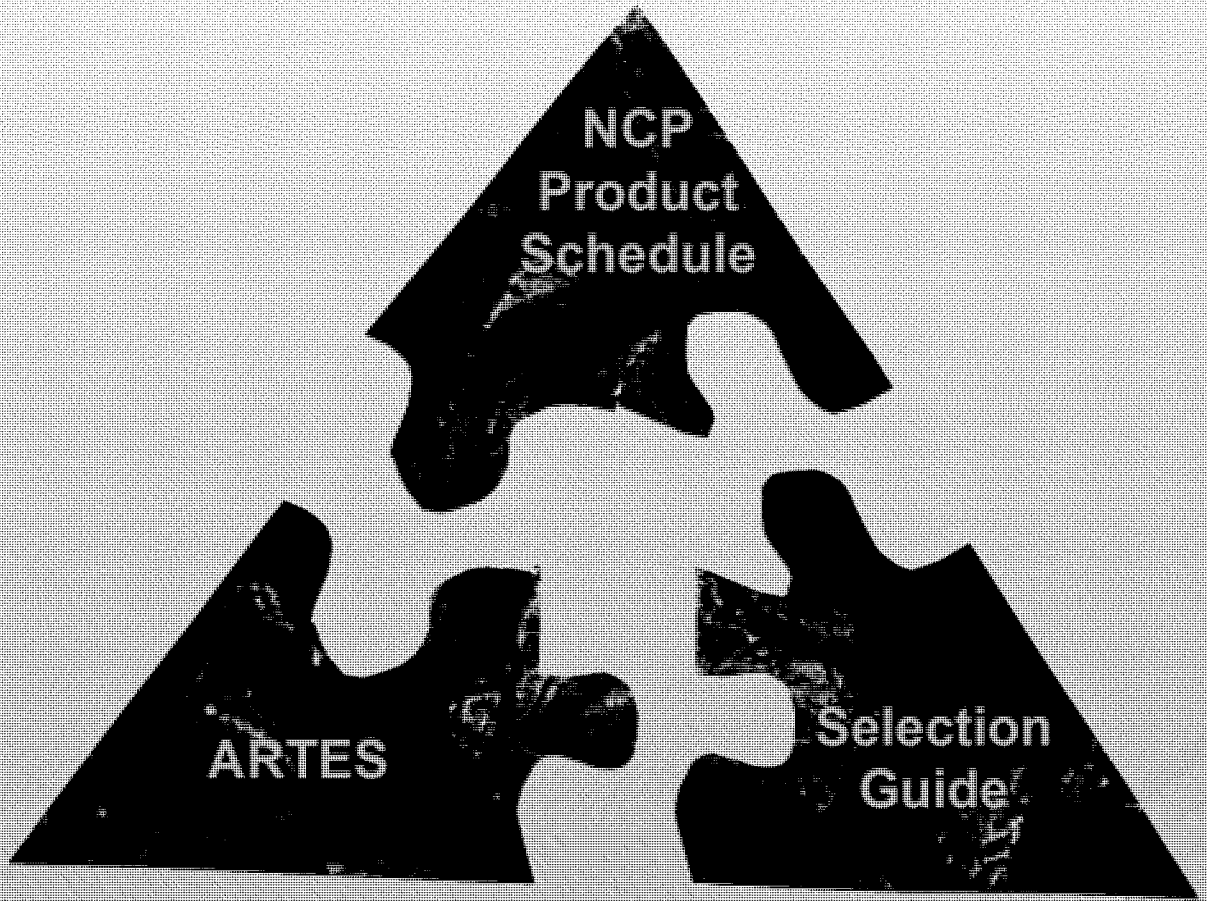
Technologies Today

- Chemical products significantly changed fro
  past formulations; research now current and
  extensive on many products
- Standardized effectiveness and toxicity
  testing required
- Must be registered with EPA for use on oil
  spills in the US

Approach For Evaluating Technologies

- "Tools" available to response decision-makers:
  - The National Contingency Plan (NCP) Product Schedule (Subpart J - 40 CFR Part 300.900)
  - Selection Guide for Oil Spill Response Technologies
  - Applied Response Tool Evaluation System (ARTES)

Putting the Pieces Together for Response Decision-making



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NCP Product Schedule

- Functions as the regulatory vehicle for use of any applied technologies
- Regulated under:
  - Section 311(d)(2) of the Clean Water Act, and
  - Section 4201 (a) of the Oil Pollution Act of 1990

Listing of a product does NOT mean that the product is recommended or endorsed by the USEPA for use on an oil spill;

Only that product has met minimum information requirements for listing.

Product Categories on NCP PS

- Dispersants
- Surface Washing Agents
- Surface Collecting Agents
- Bioremediation Agents
- Miscellaneous Oil Spill Control Agents

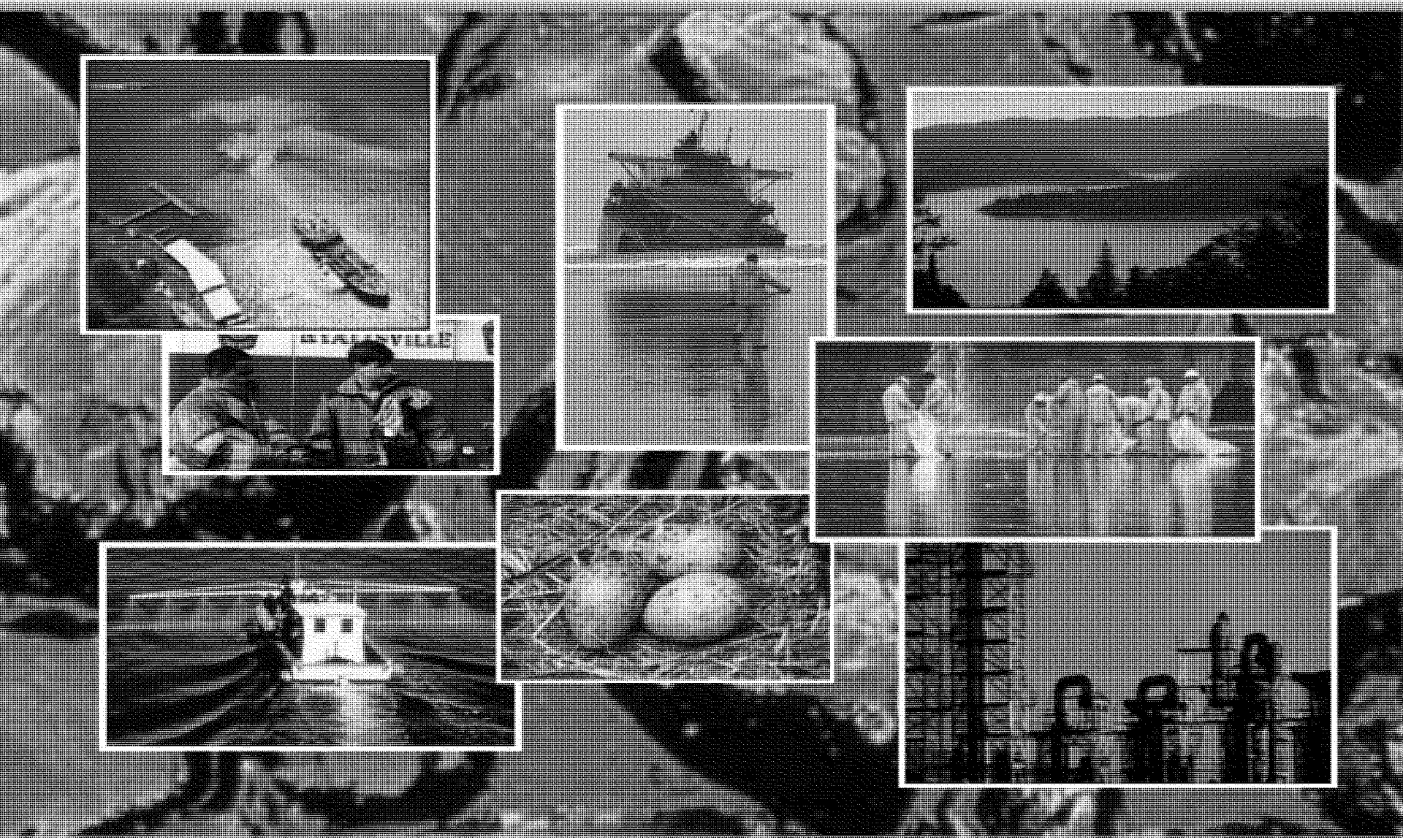
Limitations of NCP PS

- Not designed for incident-specific decision-making
- Does not allow easy comparison of products
- No way to capture lessons learned for individual product use
- Limited to chemical and biological additive products, that is…not new or advanced mechanical strategies or techniques

Alternative Response Tool Evaluation System (ARTES)

- Focus of another presentation…
- Used to:
  - evaluate a product's appropriateness for use during a specific incident, under specific circumstances.
  - as a pre-evaluation to identify conditions under which favorable outcomes are anticipated when a product is used.

Selection Guide for Oil Spill Response Countermeasures



Why Selection Guide Developed

- Designed to provide OSCs and other response decision-makers with an easy-to-use technical guidance database for considering applied oil spill technologies for use during an incident.
- Developed by Region III in cooperation with Region IV

Selection Guide, Cont'd

- Two volumes:
  - Decision-making information (Nationally applicable) and
  - Implementation/operational support documentation (regionally customizable)
- Provides information requested by decision-makers to consider, select, and implement an environmentally-appropriate product or technology

Selection Guide Information

- Bioremediation Agents
- Dispersants
- Elasticity Modifiers
- Emulsion Treating Agents
- *In situ* Burning on Land
- *In situ* Burning on Water
- Shoreline Pre-treatment Agents
- Solidifiers
- Sorbents
- Surface Collecting Agents
- Surface Washing Agents

Different Categories than the NCP!

Information, Cont'd

- Information Categories
  - Mechanism of Action
  - When to Use
  - Authority Required
  - Availability
  - General Application Requirements
  - Health and Safety Concerns
  - Limiting Factors/ Best Management Practices
  - Monitoring Requirements / Suggestions
  - Waste Generation and Disposal Issues
  - References

Content

- Instructions and matrices for selecting a strategy or countermeasure using job aid techniques
- Allows direct product comparisons among products and categories/strategies using product comparison tables
- Establishes the need for monitoring and capturing lessons learned

Content, Cont'd

- Glossary used with various products/ strategies
- History and status of product use (case study examples)
- Toxicity primer – how toxicity is measured and what the numbers really mean

Strengths of Selection Guide

- Allows comparison of similar products as well as comparison of various strategies to determine the best response
- Developed using "job aid" techniques
- Allows documentation for the decision-making process

Strengths, Cont'd

- Provides situation–specific assistance in the selection of products and strategies during planning and response, including new products / strategies
- Provides guidance on the use of response technologies and products
- Developed to capture and incorporate lessons learned

Limitations of Selection Guide

- Only as good as the information submitted; data could be limited
- Should be updated as new information becomes available (e.g., ARTES evaluations, actual use)
- June 2009 Edition available in:
  - paper format,
  - internet download (January 2003) from www.response.restoration.noaa.gov/oilaids.html
  - interactive e-version (to be released soon)

Limitations, Cont'd

- Decision-makers need to ensure that they are making their decisions with the most current information available
- Not a cook book! – Still have to evaluate incident-specific information with product(s) in mind
- Need Evaluation Team (OSC, SSC, State, USFWS, etc.) to assist with review to ensure effective evaluation for incident-specific conditions for FOSC.

e-version of the Guide

- e-version of the Selection Guide finalized
  - Components & use focus of training after lunch
  - Hands-on practical use of the guide
    - Example scenarios will be used to work through the Selection Guide Process
    - Input your own scenarios

In Summary

- Use all the pieces to solve the puzzle (make a decision)

In Summary, Cont'd

- Most effective use of these tools is in a coordinated manner
- NCP is the first step and requirement; provides guiding legislation; Nationally applicable information
- ARTES assists in the evaluation of single product / technology for regional or incident-specific conditions

In Summary, Cont'd

- Selection Guide allows:
  - Screening the incident for possible strategies/ products that could add value to a response, and
  - Comparison of products / strategies of interest relative to other techniques to select the most appropriate technology


Thanks for your attention!
If you have any questions, please call
Debbie Scholz
843-367-5126

14th Annual OSC Readiness Training Program

Training by OSCs for OSCs

OSC Training-Orlando, FL-2010
Alternative Countermeasures

Presenter: Albert D. Venosa, Ph.D.
U.S. EPA-ORD
Director, Land Remediation & Pollution Control Div.
National Risk Management Research Laboratory
Cincinnati, OH 45268
Date: February 3, 2010

January 31 – February 4, 2011
Orlando, Florida
www.oscreadiness.org

Outline of Presentation

- Two technologies to be discussed
  - Bioremediation
    - Definitions
    - Overview
    - The Process
  - Dispersants
    - Factors needed for effectiveness
    - Wave tank studies
  - Spill scenarios

BIOREMEDIATION

What is bioremediation?

- **The exploitation of living microorganisms to convert organic contaminants into biomass and innocuous end products**
  - Innocuous end products include CO_2, water, and incompletely oxidized organics

How Biological Clean-up Is Achieved

- **Naturally, without human intervention**
  - Called "Natural Attenuation (NA)" or "Monitored Natural Attenuation (MNA)"
- **Accelerated (requires human intervention)**
  - Bioaugmentation
  - Biostimulation

Natural Attenuation

- The disappearance of oil via natural means, including:
  - Volatilization
  - Washout
  - Biodegradation
  - Photolysis

Basics of Biological Treatment

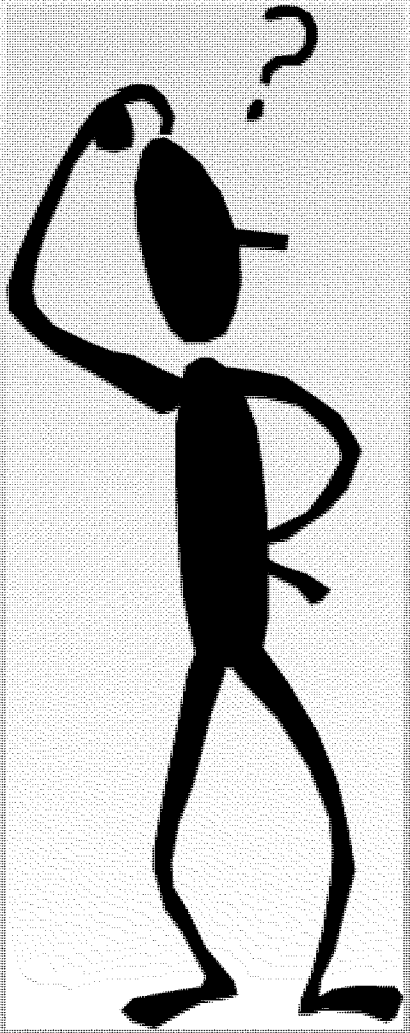
Composition of Living Matter

- **Among other trace substances, the primary components are:**
  - **Carbon: basic structural component of protoplasm and biomolecules**
  - **Nitrogen: used in formation of amino acids for protein synthesis**
  - **Phosphorus: used in formation of genetic material, high energy bonds, and membranes**

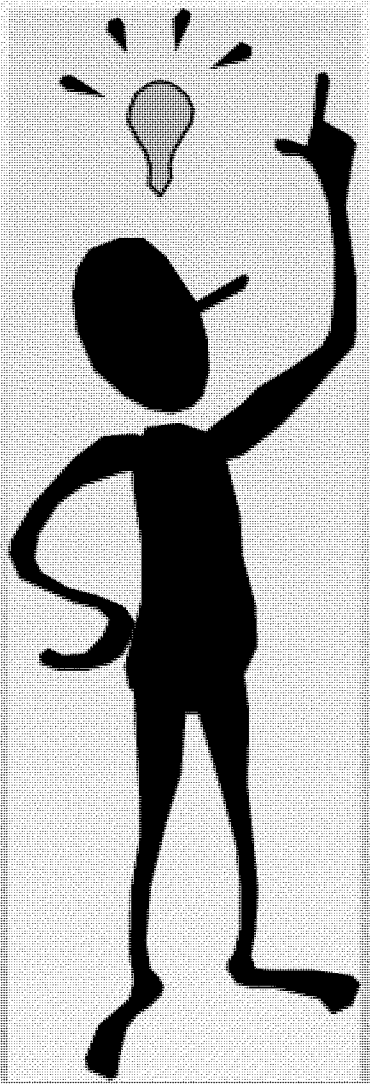
What are hydrocarbons?

- Organic compounds containing carbon and hydrogen
  - May contain fully saturated bonds (no double bonds) (alkanes)
  - May contain some unsaturated bonds (double bonds) (alkenes)
  - May be linear or cyclic and saturated (cyclohexane, hopane)
  - May be aromatic with single or fused rings (benzene, phenanthrene)
- When oil is spilled into the environment, it becomes food for living microorganisms able to utilize it for growth

What is the goal of a microorganism?



To make another microorganism!



Process of Biodegradation

- **Converting food into biomass requires several steps**
  - 1st step is addition of OH-group to alkane or PAH ring forming an **alcohol** (R-OH)
  - Progressive **oxidation** to aldehyde (R-CHO), then to acid (R-COOH) leading to chain length reduction
  - As oxygen added to hydrocarbons, compounds become more polar, more water soluble
  - Polar compounds less toxic, more biodegradable
  - In case of PAH, **ring fission** occurs followed by chain length reduction as above
- **Eventually to water, CO_2, biomass, and innocuous end products**

Biodegradable Components of Petroleum Oils

- Alkanes (saturates): easy
- Polycyclic Aromatic Hydrocarbons (PAHs): moderate
  - Fused aromatic rings, must be split
  - Biodegradability depends on number of rings and alkyl substituted groups
- Heavy polar compounds (NSO): difficult
- Asphaltenes: very difficult, complex

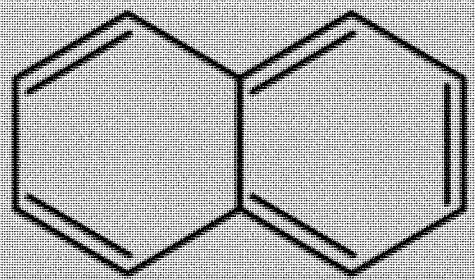
Examples

- Straight Chain Alkanes: easy to degrade. Example: HEPTADECANE (17 carbons)

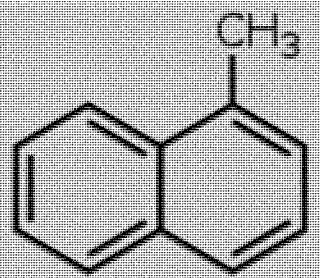
- Branched alkanes: harder to degrade. Example: PRISTANE (19 carbons)

- PAHs

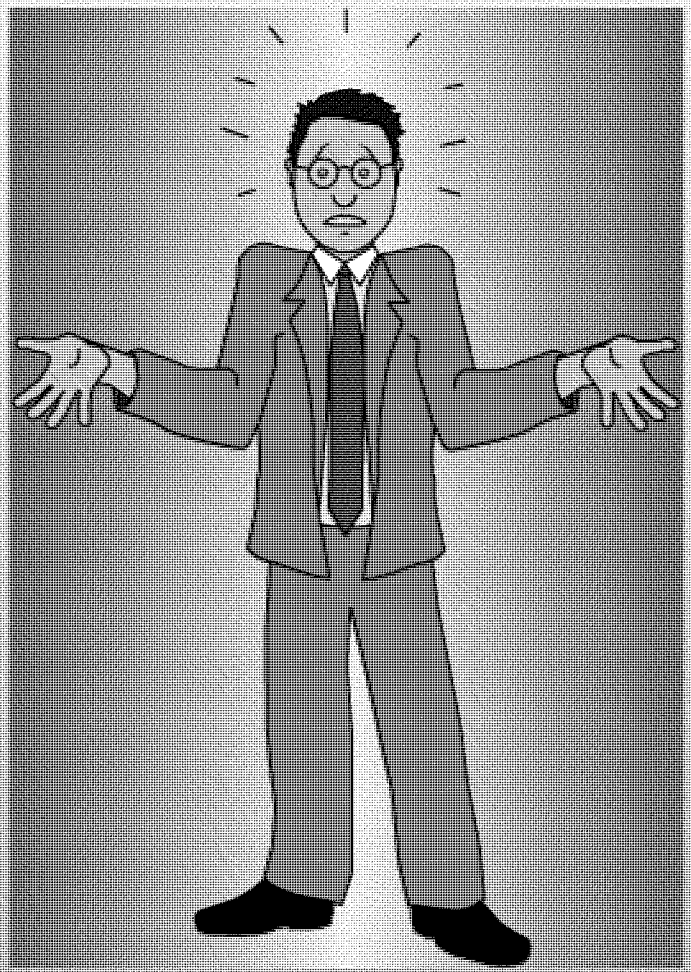
(parent, easier)



(alkyl-substituted, harder)



What are the requirements for successful bioremediation?



Requirements for Success

- Bacteria with metabolic capabilities must be present
- Rates of growth can be maximized by ensuring that:
  - Adequate supplies of oxygen and nutrients must be present
  - pH between 6 and 9
  - No other adverse circumstances
    - High salt content
    - Low moisture
- Weight of oil affects success (lighter oils more biodegradable, asphaltenes tend to inhibit diffusion)
- Oil surface area important because biodegradation occurs at oil-water or oil-sediment interface

Where are oil degraders found?

- Hydrocarbons are found everywhere
- Hydrocarbon degraders are found everywhere

An oil spill causes huge influx of carbon (food). How does an organism cope?

- To convert carbon to biomass, bacteria must have nitrogen and phosphorus and oxygen
- Bacteria will grow slowly in presence of usual amounts of N and P in nature
- To maximize rate, give more N and P
- May need to provide oxygen

Bioremediation Approaches

- **Bioaugmentation**
  - The addition of highly competent microbial cultures to an impacted site to accelerate or kick-start the biodegradation process.
- **Biostimulation**
  - The addition of factors (usually nutrients) that limit the ability of the degrading populations to grow at their maximum rate.

Assumptions for Successful Bioaugmentation

- **Culture must be able to grow rapidly on oil**
  - Can be determined in lab (NCP product testing)
- **Culture must be able to colonize the environment rapidly and out-compete the natural communities**
  - Very difficult to accomplish

Quiz Question:

Based on what you know so far, do you think adding a living culture to a spill site will accomplish the cleanup goal?

Why or why not?

Answer

- No need to add cultures to an oil spill
- Bacteria need what is lacking: N and P, and if the environment is anaerobic, also need oxygen
- We have 2 guidance documents that describe how to calculate and add nutrients to an oil spill site
  - Available on EPA website:

    http://www.epa.gov/emergencies/publications.htm#bio

Wetland Environments

- Oil spills very likely to affect coastal marshes and wetlands
- Most research data available are ORD-funded studies in Quebec and Nova Scotia

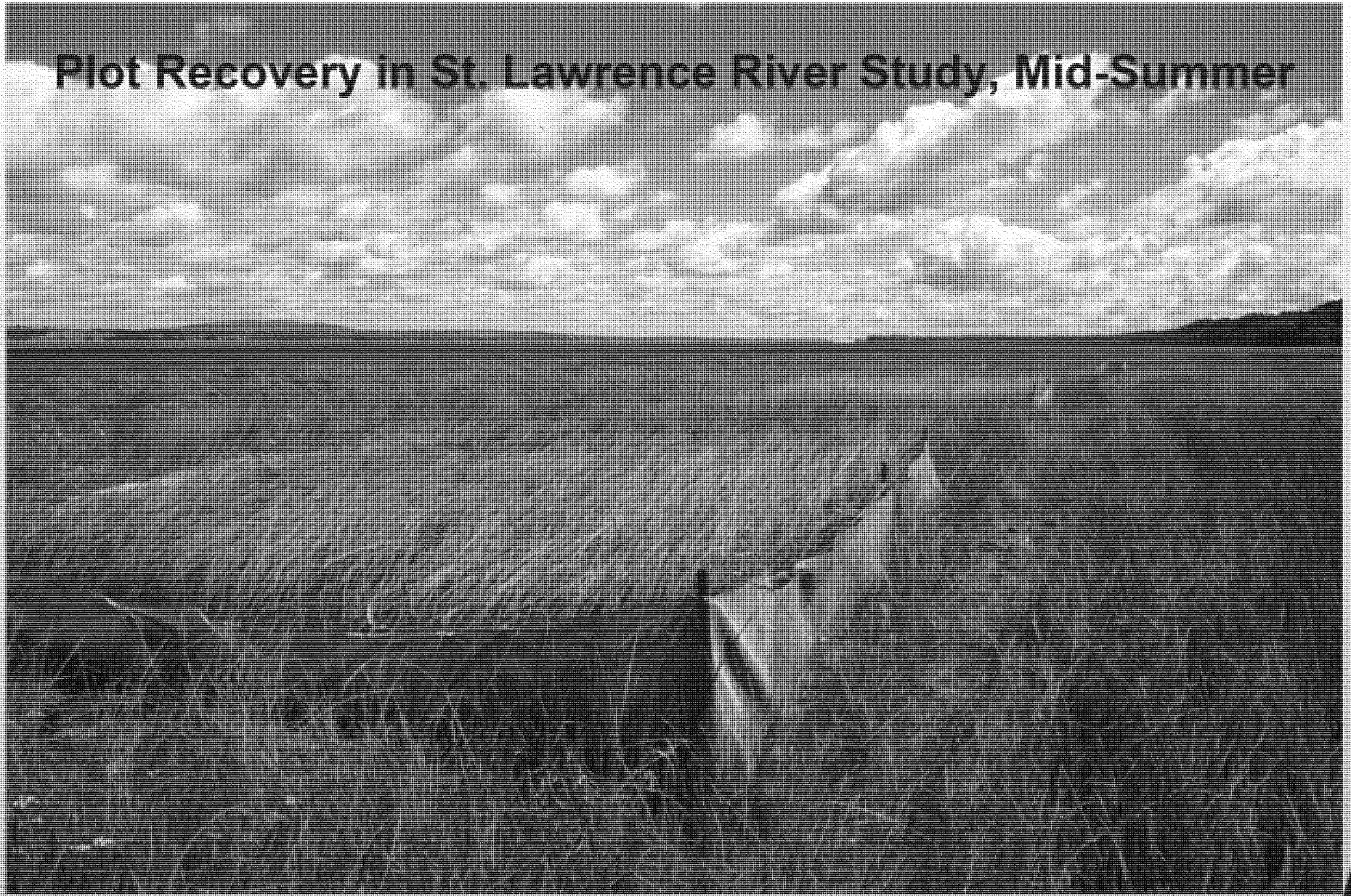
Properties of Wetland Environments

- Usually oxygen limited, very quiescent (little wave action)
  - Become anaerobic a few mm below ground surface
- Likely not nutrient-limited
  - However, plants easily out-compete bacteria for available nutrients

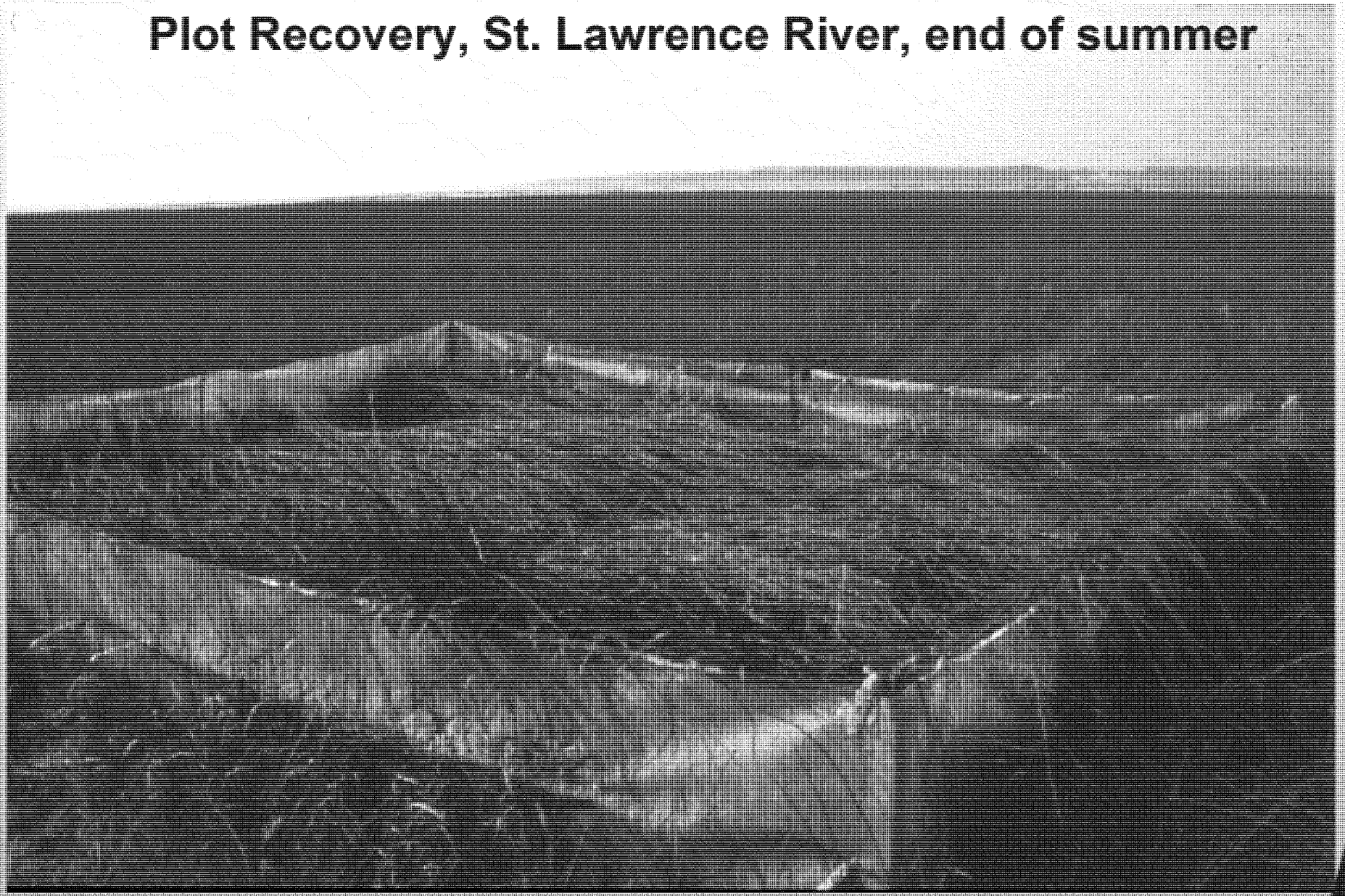
How is bioremediation applied to wetlands?

- Depends on goal:
  - If oil removal is main goal, natural attenuation may be the favored strategy, especially if penetration took place
    - Biostimulation might still be appropriate if significant penetration has not occurred
  - If ecosystem recovery is main goal, nutrient addition may speed restoration substantially

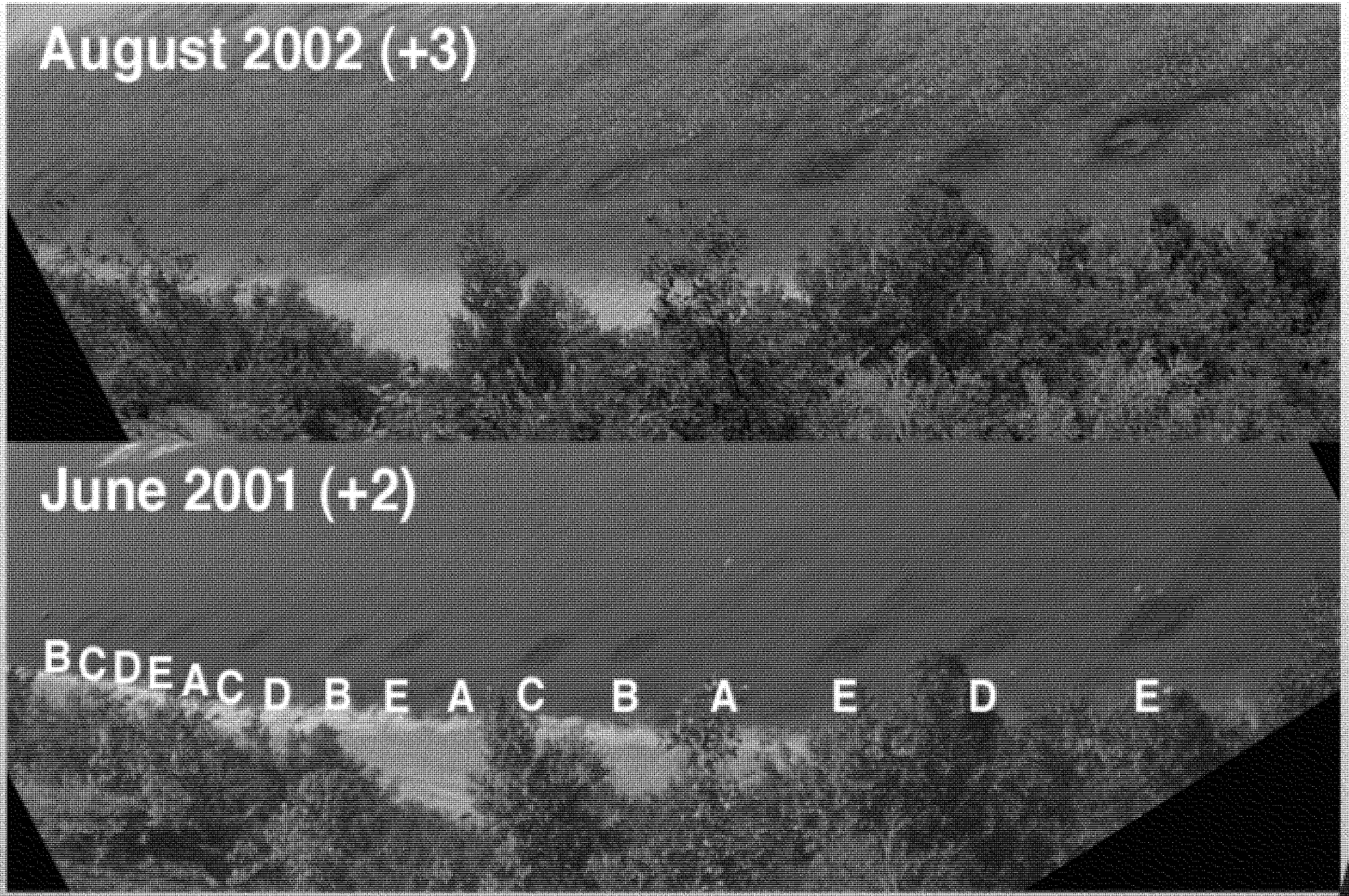
Plot Recovery in St. Lawrence River Study, Mid-Summer



Plot Recovery, St. Lawrence River, end of summer



Plot Recovery, St. Lawrence River, 2nd year



Land Bioremediation

Properties of Terrestrial Environments

- Lateral spread of oil less widespread than in coastal wetlands or beaches
- Ecological damage typically localized and limited
- Problem: vertical movement to water table

Land Farming

- Same principles apply:
  - Maintenance of supply of nutrients
  - Maintain aerobic conditions
    - At shallow depths, tilling
    - At deeper depths, bioventing or excavation followed by *ex-situ* techniques like biopiles or composting
  - Fertilizer needs for land treatment
    - Typically, ratio of 100C:10N:1P used (minimize use of nitrate)
    - Prefer adding in several increments, not all at once

Factors Affecting Land Treatment

- pH control neutral to slightly alkaline (6.5 to 8.5)
- Moisture important
- Nutrients
  - Without spill, microbial activity usually limited by carbon
  - After spill, N and P usually limiting

Vegetable Oil

- Properties similar to petroleum
  - Light nonaqueous-phase liquid (LNAPL)
- Coating of feathers, fur, and gills is harmful
  - Absence of odor and sheen results in reduced avoidance
  - Reduces thermal insulation and buoyancy
- May burn if ignited
- May clog water treatment plants (due to the polymerization property)
- Surface oil may prevent re-aeration of water column

Composition of Vegetable Oils

- Triglycerides
  - Long chain fatty acids coupled to glycerol, a 3-carbon compound with 3 alcohol (-OH) groups
  - Fatty acids are long chain alkanes (saturated) or alkenes (unsaturated) with a carboxylic acid group at end (-COOH)
    - To make a triglyceride, the fatty acids replace the –OH groups
  - Examples
    - Stearic acid (18 carbons with no double bonds)
    - Oleic acid (18 carbons with one double bond)
    - Linoleic acid (18 carbons with two double bonds)
    - Linolenic acid (18 carbons with three double bonds)

Chemical Effects of Vegetable Oil Spills

- High BOD may cause oxygen depletion
  - Greater effect on DO than petroleum oils
- Unsaturated oils (liquids at cold temperatures) are subject to chemical (abiotic) oxidation
  - Polymerization due to chemical oxidation and cross-linking
  - Rancid odors may develop rapidly
  - Unsaturated oils form gum balls and varnishes
- Saturated oils turn solid at cool temperatures
- May be toxic or form toxic products
  - Especially free fatty acids and chemical oxidation products

Biodegradability of Vegetable Oils

- **Degradable both aerobically and anaerobically**
  - Because they're already oxygenated (fatty acids), anaerobic biodegradation can proceed rapidly
  - This distinguishes these oils from petroleum oils
- **If polymerization occurs, biodegradation is inhibited**
  - Gumball and varnish formation

DISPERSANTS

What are dispersants?

- Compounds that contain one or more surface active agents (surfactants) and possibly a solvent
  - Surfactants reduce the oil-water interfacial tension
  - Solvents reduce oil viscosity
- When applied to a slick, small droplets are formed that intermix in the water column, increasing the surface area of the oil

What makes dispersants effective?

- Properties of the oil
  - Viscosity
  - Weight
- Slick thickness
- Dispersant:oil ratio (DOR), best at 1:25 to 1:50
- Surfactant loss at the water surface
- Surface tension of water
- Salinity
- Mixing energy due to wave action

Importance of Mixing Energy

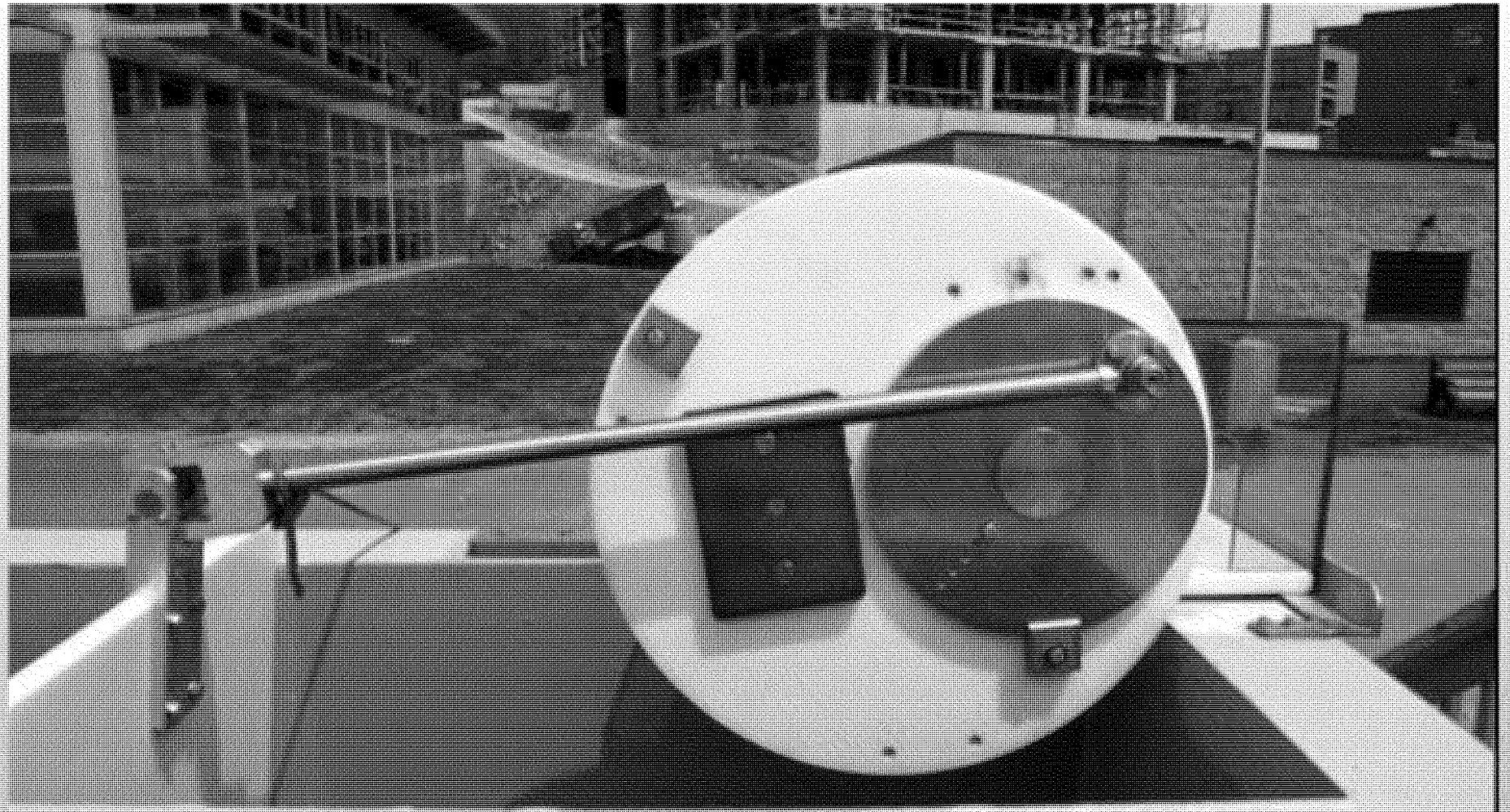
- **Dispersion takes place at small scale (< 1 cm)**
  - Simulation in lab possible since small eddies similar to eddies at sea
  - Energy dissipation rate per unit mass is the measure of mixing energy
    - Units are Watts/kg water
    - Dissipation of kinetic energy due to laminar and turbulent shears, which are directly proportional to velocity gradients
    - Measure velocity gradients to compute energy dissipation rate

Wave Tank at Halifax, NS

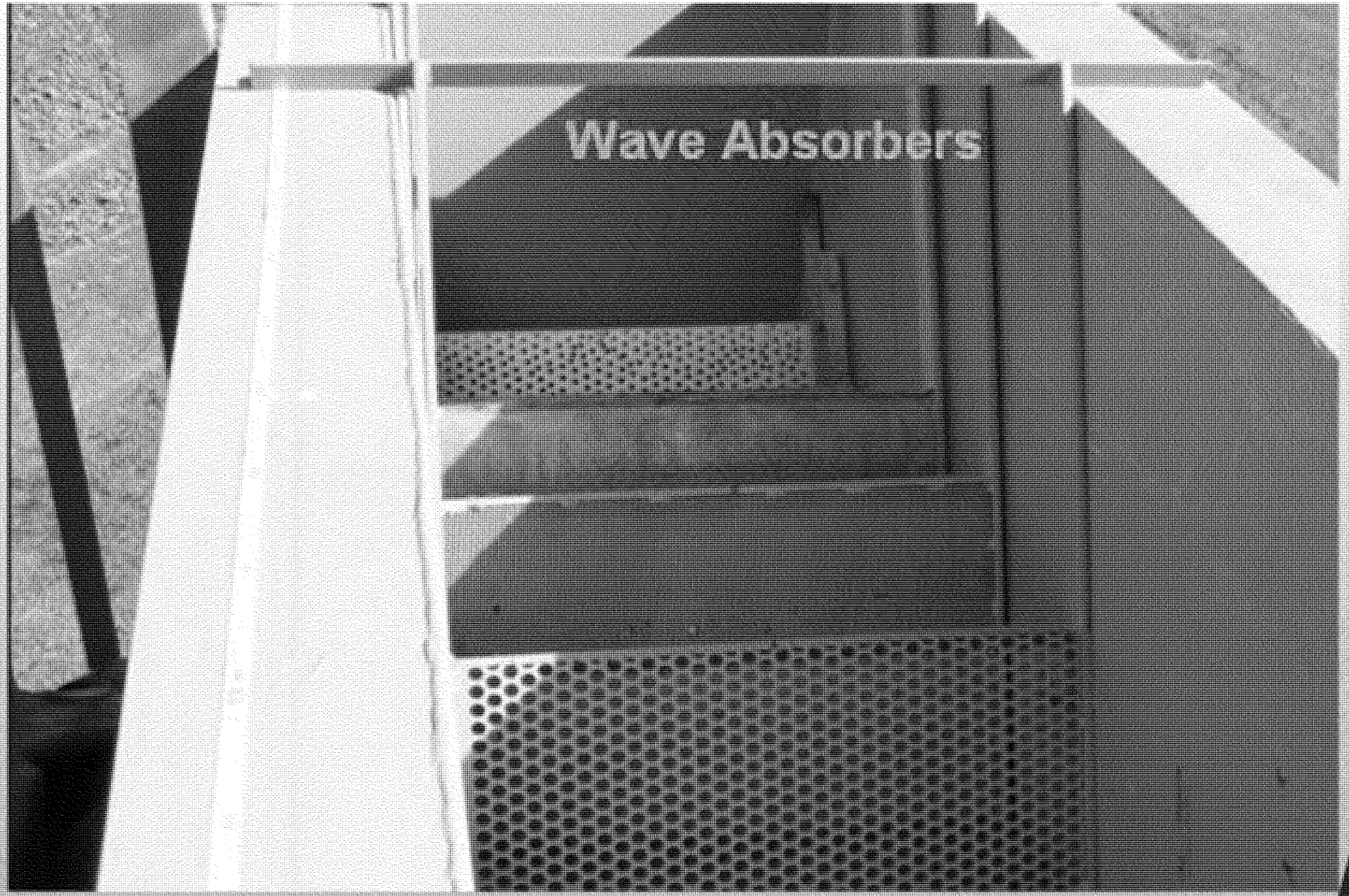
- A collaboration between EPA and Fisheries & Oceans Canada (DFO)
- Wave tank fabricated at the Bedford Institute of Oceanography (BIO), Dartmouth, NS
- Objective: to study dispersant effectiveness at various mixing energies representative of sea states
  - Experiments have taken place to define energy of breaking and non-breaking waves
  - Batch and flow-through conditions

Characteristics of Wave Tank

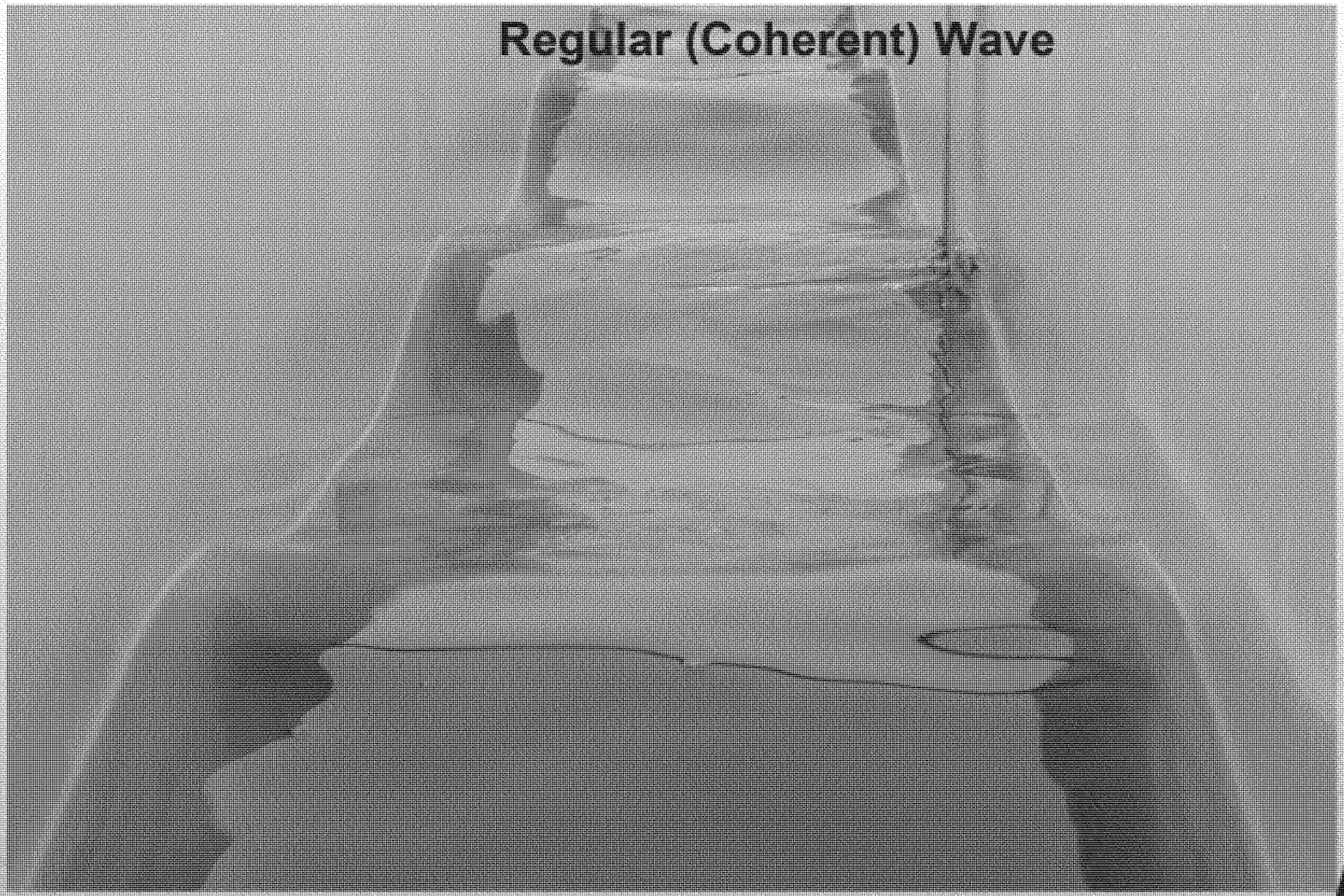
- Dimensions: 32 m x 2 m x 0.6 m
- Materials of construction: epoxy-coated steel
- Computer-controlled wave maker able to produce regular and breaking waves
- Wave absorbers to mitigate reflection
- Can be drained and filled in < 2 h
  - Allows for cleaning between runs to prevent residuals from confounding experiments
- Can be operated in batch and flow-through modes



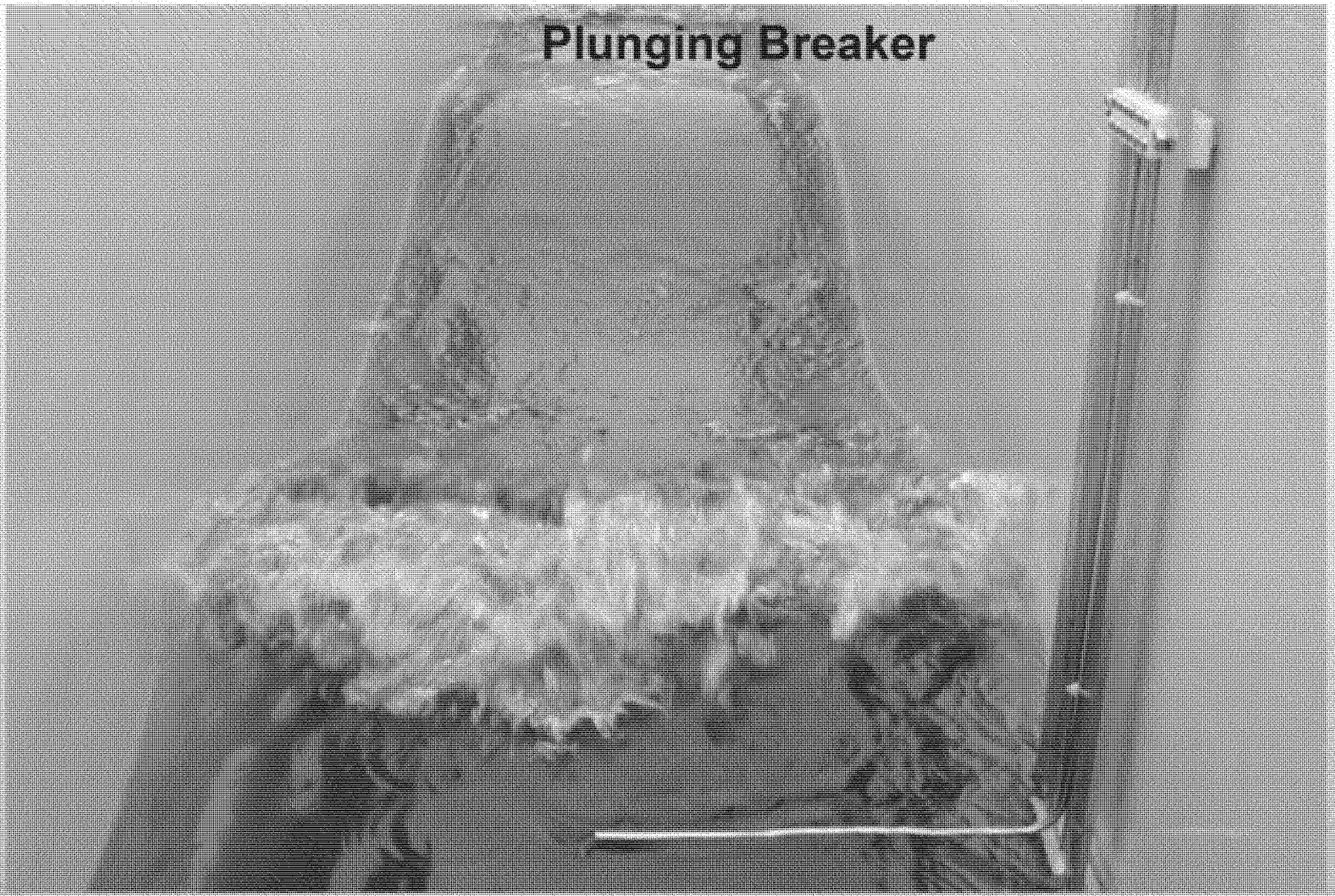
Wave Maker



Regular (Coherent) Wave



Mild, Spilling Breaker



Dispersant Effectiveness

- **Breaking waves are important for effective and lasting dispersion**
  - Breaking waves shear oil slick into tiny droplets that don't easily recoalesce
  - Breakers push oil downwards into water column where currents may carry the dispersed oil away
- **Regular waves disperse oil somewhat but do not impart sufficient energy to break up the oil into small droplets or push the droplets down deeply into the water column**
  - They do maintain sufficient energy to maintain dispersed state
- **Mineral fines enhance dispersion of oil into water column**

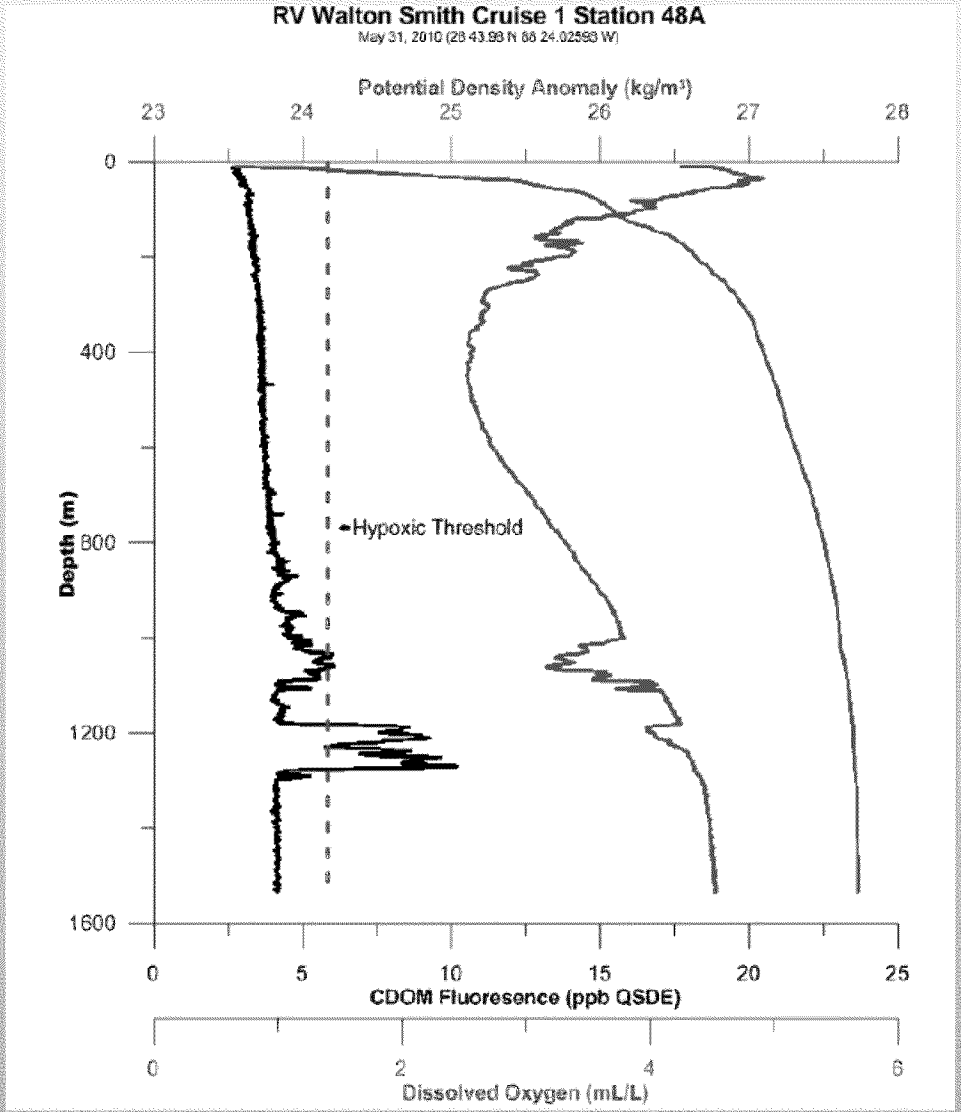
Summary of Dispersant Use in Gulf Spill

- EPA science team developed sampling and monitoring plan for deep sea injection and surface application
- Called for measurement of:
  - Dispersed oil by fluorometric techniques
    - CDOM (colored dissolved organic matter)
    - CTD (conductivity, temperature, depth)
    - More advanced but proven techniques (fixed wavelength)
  - Droplet size distribution (LISST)
  - Analytical chemistry (GC/MS and TPH) of batch samples
  - Dissolved oxygen
    - Hypoxic level was 2 mg/L (or 1.4 mL/L)
  - Toxicity by rotifer assay (Rototox)

Subsurface Injection of Dispersant

- **Volume based on DOR, high degree of uncertainty**
  - Optimum volumetric DOR ~ 1:25 to 1:50
  - Flow rate of oil unknown for first 30 days
    - Originally thought to be 5,000 bbl/d (210,000 gpd)—gave a DOR of 1:14 (too much dispersant)
    - Later adjusted higher and higher to final flow of 62,000 bbl/d (2.6 million gpd or a DOR of 1:174 (too little dispersant)
    - Due to uncertainty of ecological effects, dispersant use was fixed at 15,000 gpd for spill duration
- **Dispersed oil plume detected consistently at 1,100-1,300 m**
  - Moving predominantly in SW and NE directions (isobath flow)
  - Active natural seeps mapped at 12 SW and 17 km NE of wellhead

Vertical profile showing 2 DO depressions coincident with fluorescence peaks



Future Research Based on BP Spill

- Improvements in fluorometric monitoring of dispersed and non-dispersed oil plumes needed
  - Questions remain on optimum sensor configuration and NOM interference
  - 4-D mapping of dispersed oil plumes (leverage with NOAA)
  - Improved, innovative laser-based fluorometry (leverage with Canada DFO)
  - Better, faster analytical methods for measuring fate and transport of dispersed oil
- Develop green oil spill mitigation approaches for reduced toxicity and persistence in environment
- Better understanding of water-in-oil emulsions (mousse)
- Assessment of weathering effects on dispersion of oil
- Biodegradability of tar balls and other emulsions
- Exposure assessment scenarios for human and ecosystem effects
- Toxicity testing over many trophic levels
- Development of comparative risk assessments for sensitive species to inform risk management options

Application of SMART Protocol OSC Readiness, 2011

Harry L. Allen
US EPA/ERT

What is SMART?

(From the NOAA Dispersant Applicator's Observation Job Aid)

- "Special Monitoring of Applied Response Technologies" (SMART) as a joint product of the USCG, NOAA, and EPA.
- SMART grew out of the Special Response Operational Monitoring Plan (SROMP) to avoid arguments over whether or not the dispersants were working.
- SMART: establishes a monitoring system for rapid collection and reporting of real-time, scientifically based information, in order to assist the Unified Command with decision-making during in situ burning or dispersant operations.
- SMART recommends monitoring methods, equipment, personnel training, and procedures that strike a balance between the operational demand for rapid response and the Unified Command's need for feedback from the field in order to make informed decisions.

How do we use SMART?

- SMART applies particularly to the use of chemical dispersants and *in situ* burning as response alternatives.
- SMART is a decision-making tool during spill operations at a response and a planning tool where pre-approval is sought for burning or dispersant use.
- The SMART protocol has been updated and is available on the NOAA Website:
- http://response.restoration.noaa.gov
- Differences between NOAA and EPA arise over the interpretation of “response technology effectiveness.”

How much dispersion is “effective” and will it cause aquatic toxicity?

- The NCP Product Schedule lists the effectiveness and toxicity of chemical countermeasures, but the RRT needs to approve their use.
- The minimum requirements for listing are dispersant effectiveness of 45% at the application rate of 1:20 Dispersant to Oil Ratio (DOR) in a swirling flask and a toxicity <1/10 LC50. The next slides are typical examples.
- Researchers have demonstrated effective dispersion in the lab at DORs of 1:25 and 1:100 using the new baffled flask test.
- The actual rate for the Deep Sea dispersant application at the well-head was about 1:195 (9 gpm/1,650 gpm).

SUMMARY OF SUBPART J NOTEBOOK INFORMATION ON DISPERSANT FORMULATIONS

Material Tested	Species	LC50 (ppm)	
COREXIT® EC9500A	Menidia beryllina	25.20 96-hr	
	Mysidopsis bahia	32.23 48-hr	
No. 2 Fuel Oil	Menidia beryllina	10.72 96-hr	
	Mysidopsis bahia	16.12 48-hr	
COREXIT® EC9500A &	Menidia beryllina	2.61 96-hr	
No. 2 Fuel Oil (1:10)	Mysidopsis bahia	3.40 48-hr	More toxic when dispersed.
Reference Toxicant (SDS)	Menidia beryllina	7.07 96-hr	
	Mysidopsis bahia	9.82 48-hr	

SWIRLING FLASK DISPERSANT EFFECTIVENESS TEST FOR COREXIT 9500A TEST WITH SOUTH LOUISIANA (S/L) AND PRUDHOE BAY (P/B) CRUDE OILS

Oil Effectiveness (%)	%
Prudhoe Bay Crude	45.3%
South Louisiana Crude	54.7%
Average of Prudhoe Bay and South Louisiana Crudes	50.0%

Use SMART to know you are getting effective dispersion?

- SMART Tier 1 relies on visual observation of dispersant effectiveness by trained observers.
- SMART Tier 2 employs field analytical techniques such as fluorometry (referenced to background), turbidity, droplet size distribution, conductivity, temperature, and depth (CTD) to estimate dispersion.
- SMART Tier 3 requires sampling and analysis to determine what oil fractions are being dispersed, whether the emulsions are physical or chemical, and whether there are toxic chemicals in the emulsion. Lab work is usually required. Dissolved oxygen is also considered a Tier 3 analyte, but electronic DO meters need lab calibration.

Estimating Initial Oil on the Water

- It is an important first step to estimate the amount of oil on the surface in order to determine the required dispersant loading or to predict the feasibility of *in situ* burning.
- Al Allen of Spiltec has created an elegant oil thickness estimation system. Using this and an estimate of the area of oil coverage, we can calculate oil volume on the surface. If we have made an initial estimate before dispersant application, the relative degree of dispersion can be estimated as closely as by any other means.

Visual Estimation of Oil Thickness & Quantity

Note:
1 μm = 1 m^3/km^2
≈ 0.026 bbl/acre

200 μm
2×10^{-1} mm
8×10^{-3} in.

0.3 μm
3×10^{-4} mm
1.2×10^{-5} in.

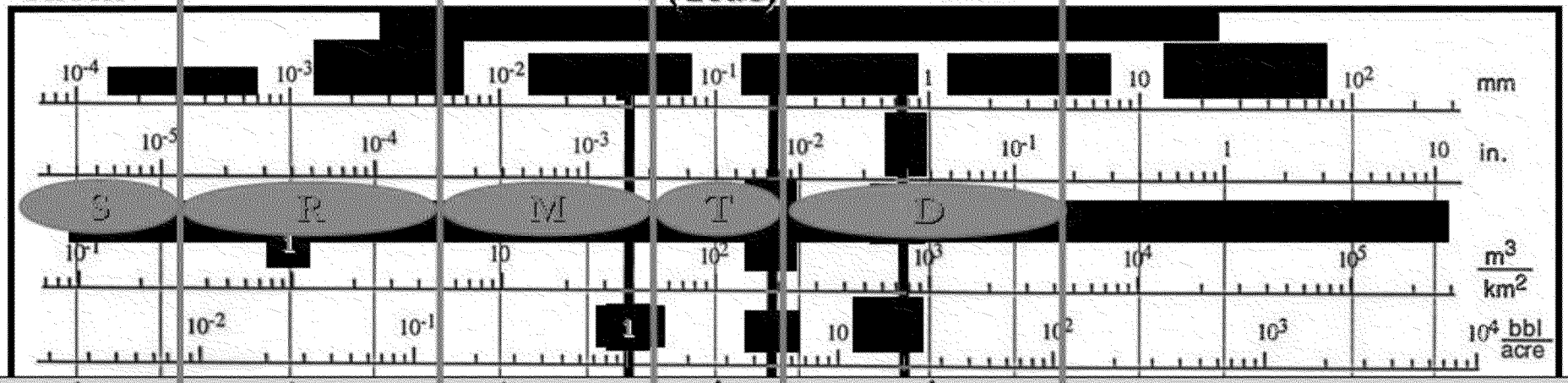
5 μm
5×10^{-3} mm
2×10^{-4} in.

50 μm
5×10^{-2} mm
2×10^{-3} in.

4,000 μm
4 mm
0.16 in.

Color Code

Silvery Grey Sheen | Rainbow | Metallic | Trans. Dark (True) | Dark (True) Color



0.1 μm
10^{-4} mm
4×10^{-6} in.

1 μm
10^{-3} mm
4×10^{-5} in.

10 μm
10^{-2} mm
4×10^{-4} in.

100 μm
10^{-1} mm
4×10^{-3} in.

1000 μm
1 mm
4×10^{-2} in.

If not bounding, use as "nominal" mid-range values for each code #

Crude Oils Appear Dark ("True") in Color

Warm Stable

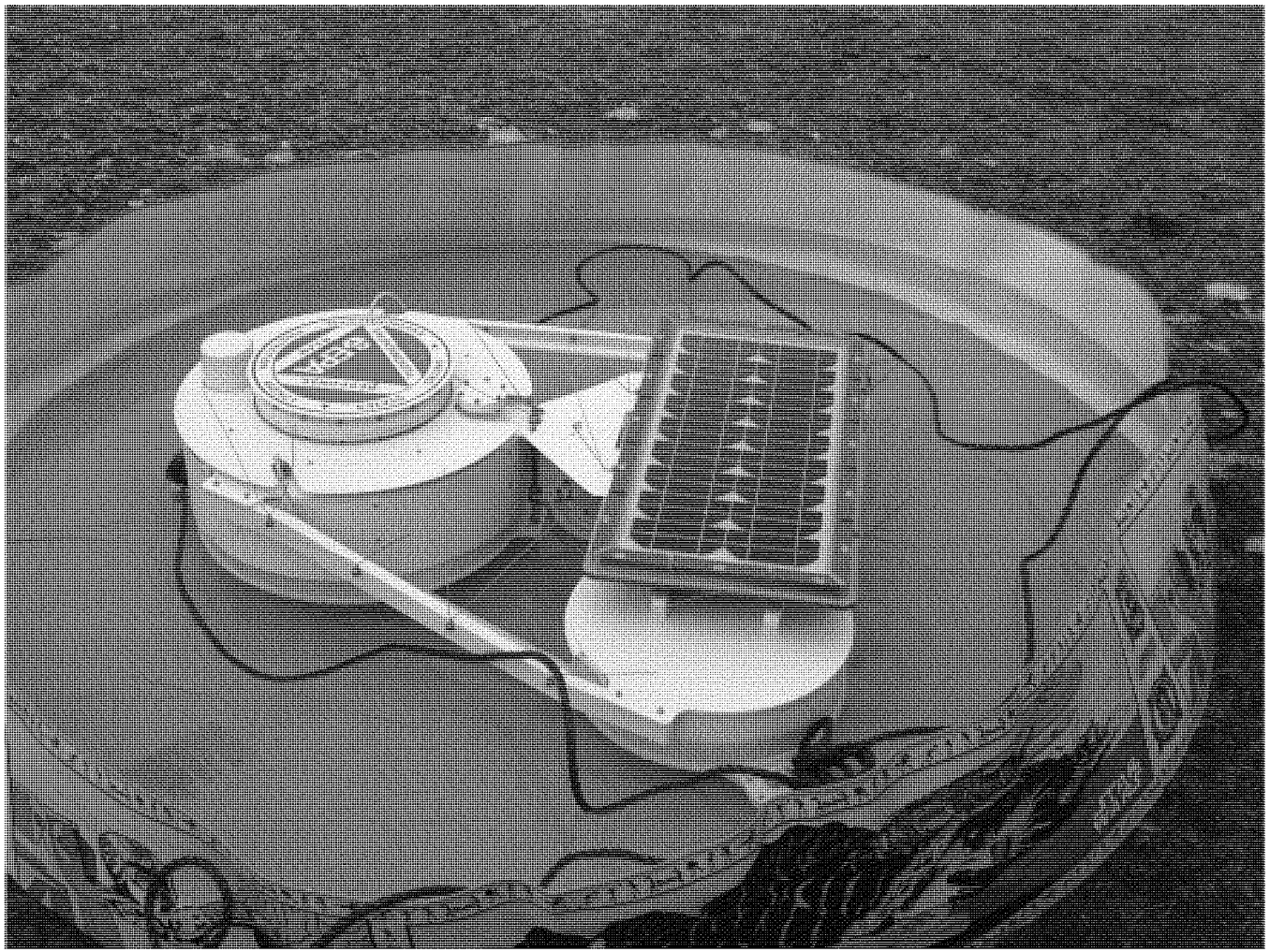
Emulsions

Cold Stable

Dr. Alan A. Allen, Spiltec

The Leakwise Detector “Waverider” by GE Systems

May be used to measure the thickness of floating or emulsified oil remotely. Then it emails and texts this information to Command.

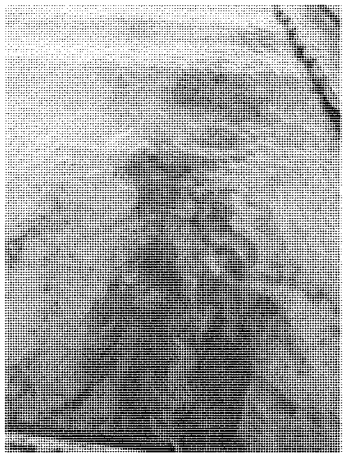


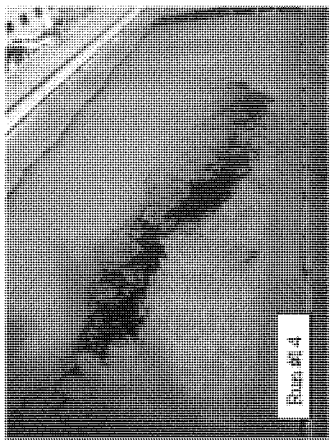
Standardizing SMART Tier 1

- Visual assessment of oil slick and oil in surface waters:
  - Trained observers may be hard to find.
  - Attempts to standardize observation and reporting of visual dispersion observations
  - Assesses ONLY initial break up of slick into dispersed oil droplets
  - Remember that dilution of the dispersant may allow the oil to resurface after a few hours. Think “Terminator 2.”

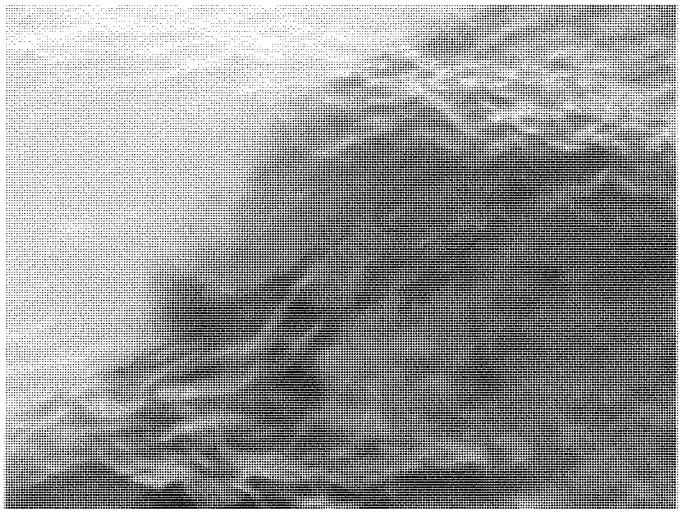
Lewis Four Point Effectiveness Scale	
Effectiveness rating	**Description[a]**
1	No visible evidence of dispersion
2	Some evidence of partial dispersion
3	Moderate and incomplete dispersion
4	Rapid and complete dispersion
a. Based only on behavior of oil in first 15 minutes after dispersant added and agitated by waves.	

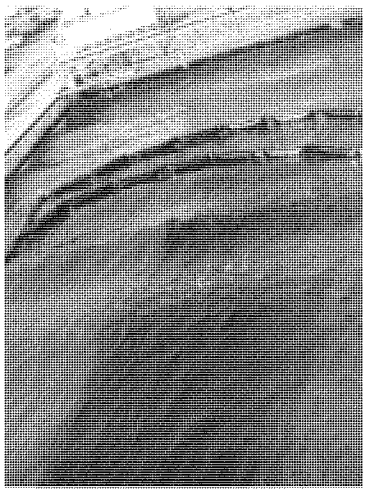
Visual Effectiveness = 1



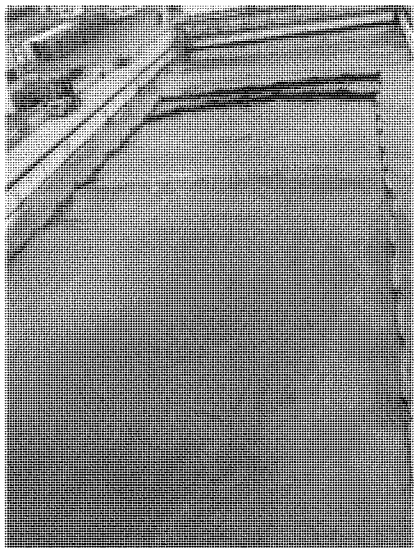


Visual Effectiveness = 3





Visual Effectiveness = 4



SMART Tier 2 - Fluorometry

- Dissolved unsaturated and aromatic hydrocarbons, when excited by light waves at 280-320 nm, emit photons (fluoresce) at characteristic wavelengths. Aromatic hydrocarbons emit at about 340 nm; saturated hydrocarbons at about 445 nm. The size of the signal relates to the concentration of each fraction.
- Tier 2 SMART procedure makes use of this characteristic. Deploying a fluorometer by boat, the monitoring team samples at a depth of 1 to 2 m along transects through sections of the slick before and after dispersant spraying.

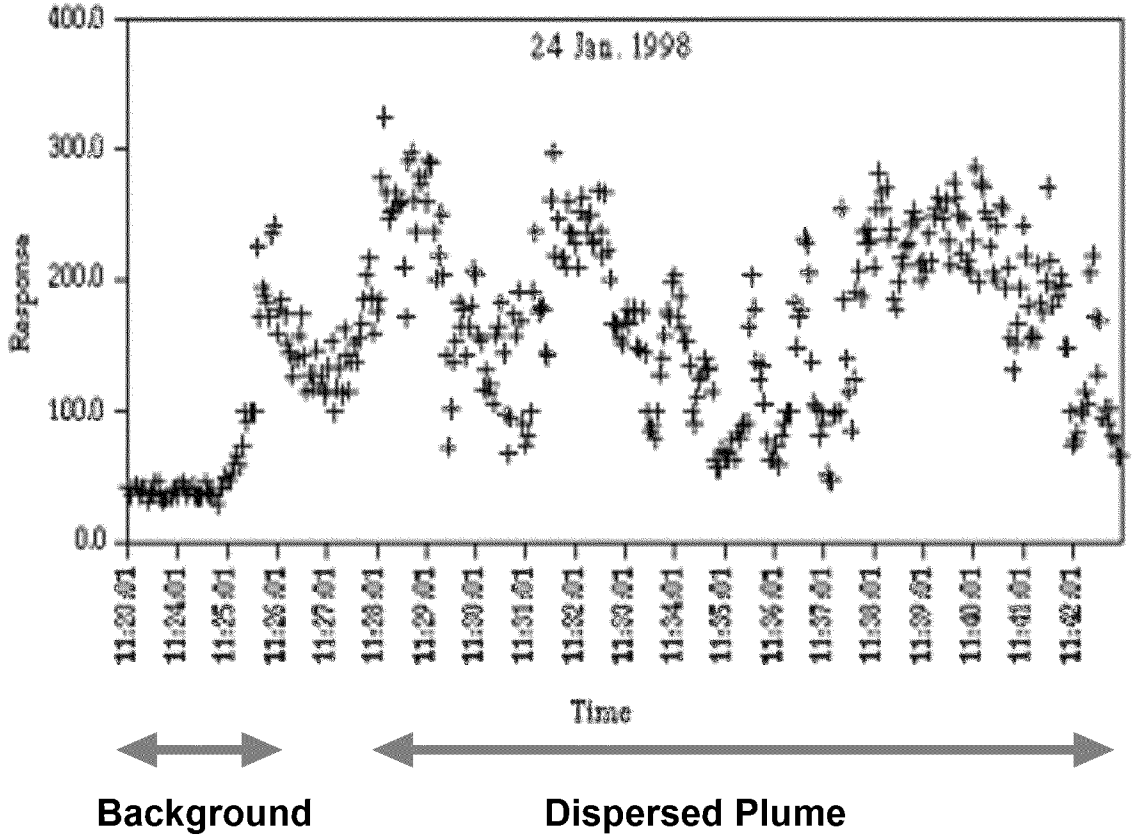
SMART Tier 2 – Fluorometry (cont'd.)

- Vessel tows fluorometer outside the oil plume and bisects the oil plume to get a baseline of natural dispersability.
- Aircraft applies dispersant over target area.
- Dispersant applications are judged to be effective if fluorometer readings under treated slicks are at least 5 times greater than under untreated slicks (i.e., under the slick prior to treatment).
- Grab samples are taken from the water stream or by Kemmerer at predetermined intervals for post-event calibration of the fluorometer using the actual oil spilled and for Tier 3 analysis if required.

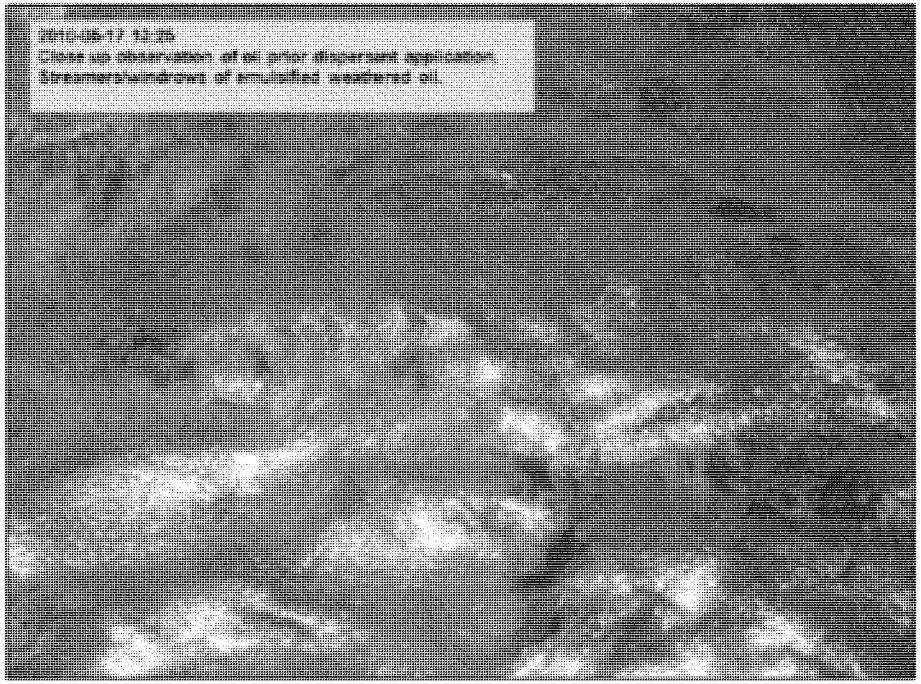
Steps for SMART Tier 2 - Fluorometry

- Vessel tows fluorometer thirty minutes after dispersant application at a starting position outside the oil plume and bisects the plume to determine the effectiveness of the dispersant application.
- Vessel tows fluorometer sixty minutes after dispersant application at a starting position outside the oil plume and bisects the plume to determine the effectiveness of the dispersant application.

Ideal Surface Application of Dispersant

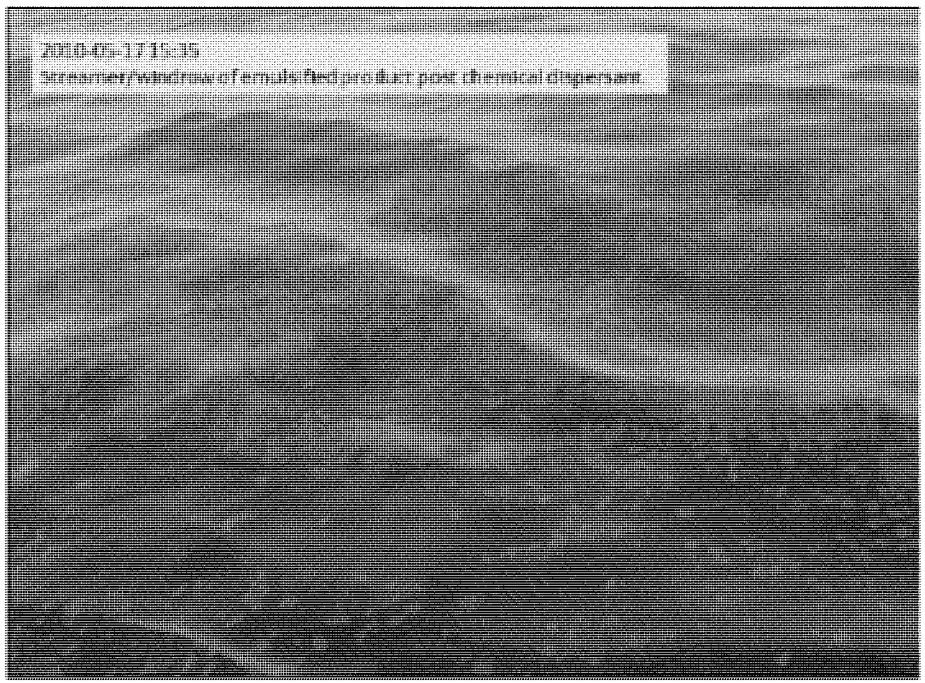


"Ideal" Fluorometry Trace from Historical Record



What does it look like?

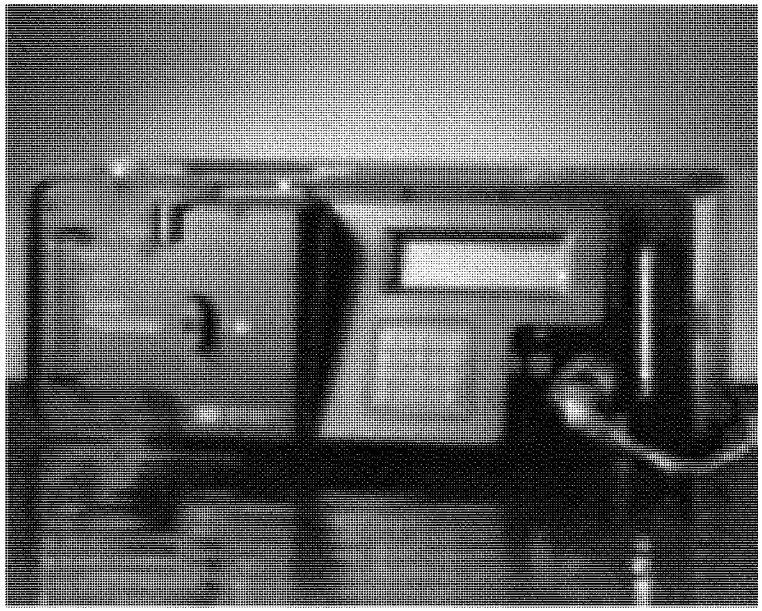
Data to date show dispersant effectiveness is consistent with our expectations



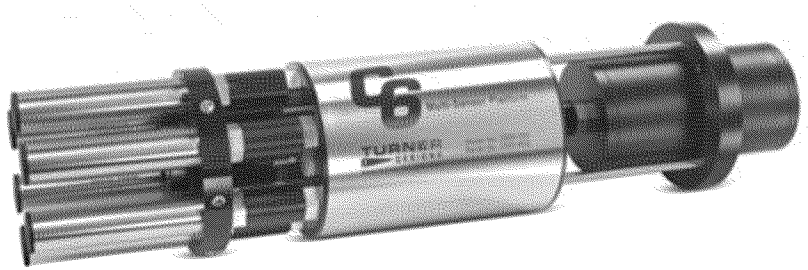
Choosing your Weapons for SMART Tier 2

- Fluorometers
- Particle Counters
- Bubble Size Indicators

Turner AU 10 Fluorometer
The “Old”



Turner Cyclops C6 Fluorometer
The “New”



Turner C3 Fluorometer

"Weapon of Choice" in the Gulf

The Turner C3 fluorometer (excitation wavelength of 320 nm and emission wavelength of 400-600 nm) was towed by boat through the dispersed oil plume at 1-m and 2-m depths to make measurements of the dispersed oil plume both within the plume and up to 50-m outside the plume.

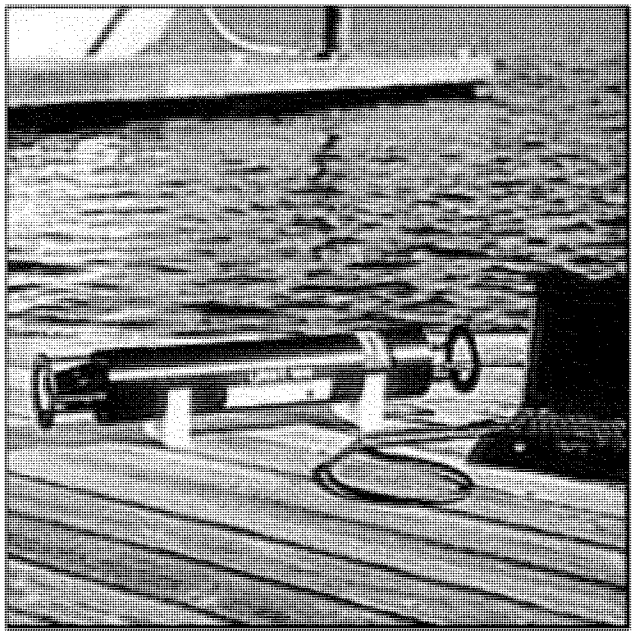
BUBA Buster / Wetstar x GPS

- In-situ fluorescence detector combined with GPS
- Simple setup
- Continuous monitoring along transects
- Provides spatially-registered estimates of concentrations

TAMU FL3 and LISST-100X at Ohmsett

Sequoia Particle and Particle-size Analyser

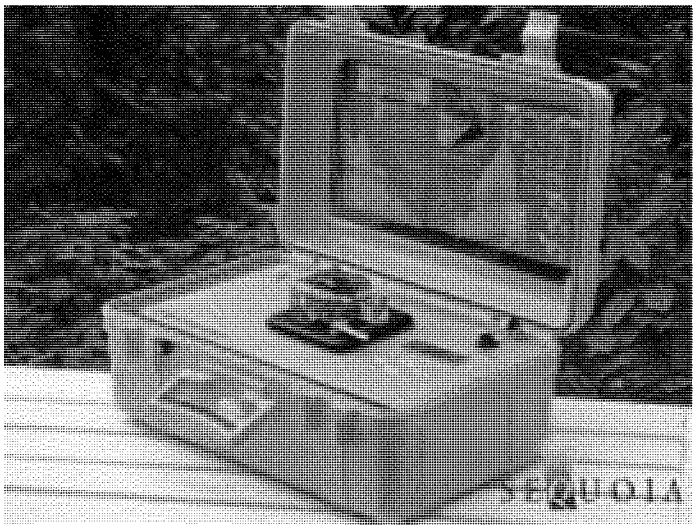
- Measures both oil droplet abundance and particle size in the range of 2.5 – 500 microns
- In-situ measurement
- Little set up needed
- Requires “blank”
- Needs clean water standard
- Continuous monitoring on transects
- Laser *In-Situ* Scattering and Transmissometry (LISST) instrument.



LISST–100X Type-C

Sequoia On-Board Analysis

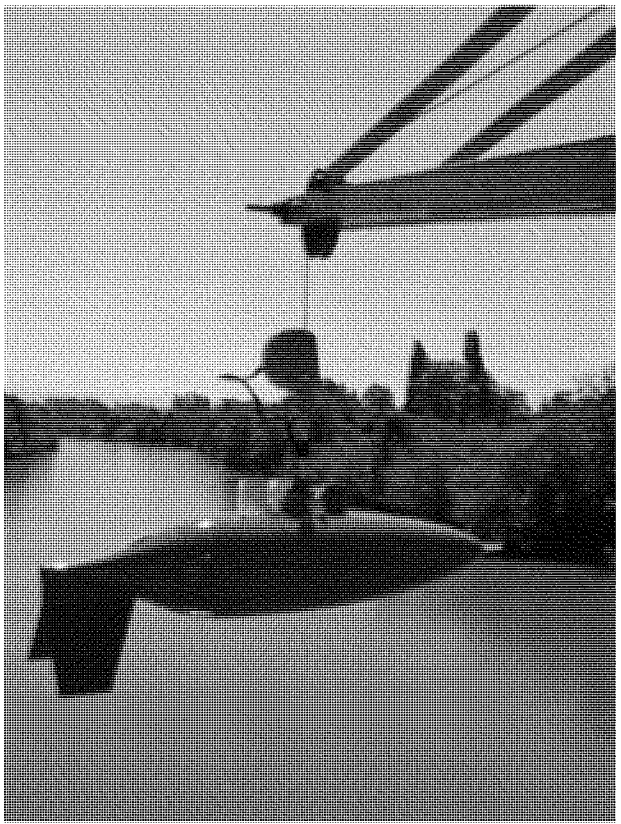
- Ex-situ particle-size analyser
- Analytical capability of LISST 100, but in ex-situ format
- Continuous monitoring
- Requires pump on effluent side
- Requires “blank”
- Amenable to post-calibration



Sequoia Steam-Side

Sequoia Towable

- Towable in-situ particle-size analyser
- Analytical capability of LISST 100, but in easily towable
- Designed for freshwater,but could be set up form marine use

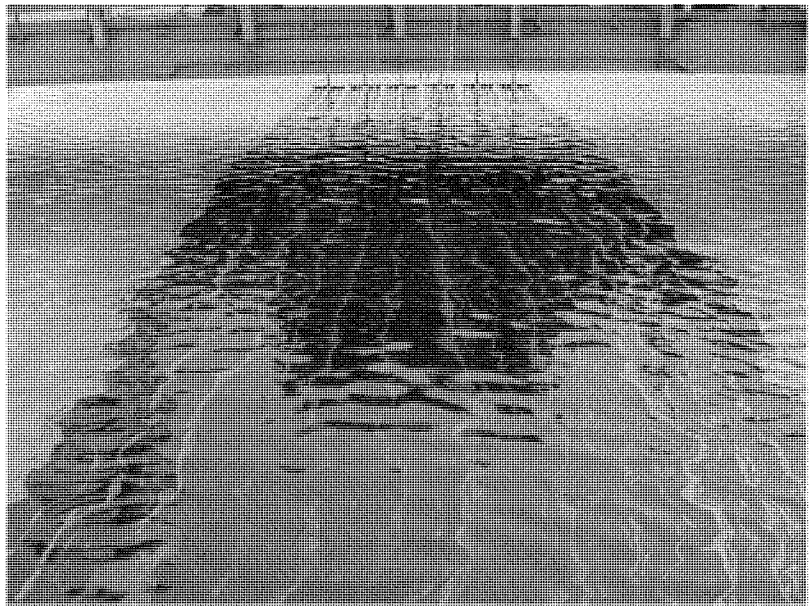


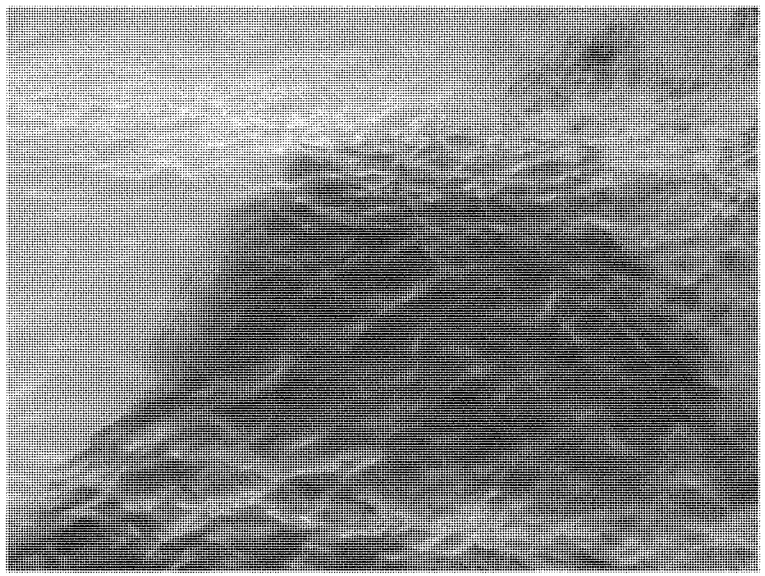
Sequoia SL

Summary of New Items
Based on a presentation by Ken Trudel

Instrument	Pre-Deployment Engineering & Peripherals	On-Site Set-up and Calibration	Weight	Cost	Global Positioning System
Turner 10AU	Pump, power,hose, down-rigger	Assembly, calib w dye and/or oil	35 lb Fluorometer only	$ 16 K	Extra
BUBA Buster	In-situ	Little set up; No user calib.; Diesel Standard		$ 4K/ Unit Based on CDOM cost	Included
LISST -100X	In-situ	Blank	25 lbs	$ 29.5 K/ Unit	Extra
LISST Stream-Side	Pump, power,hose, down-rigger	Blank	15 lbs	$ 15K/ Unit	Extra
LISST SL	In-situ	Blank	35 lbs	$ 35K/ Unit	Extra
Turner C3	In-situ	Intuitive Calibration	3.6 lbs	$ 8.5 K	Extra

Testing of Equipment at OHMSETT

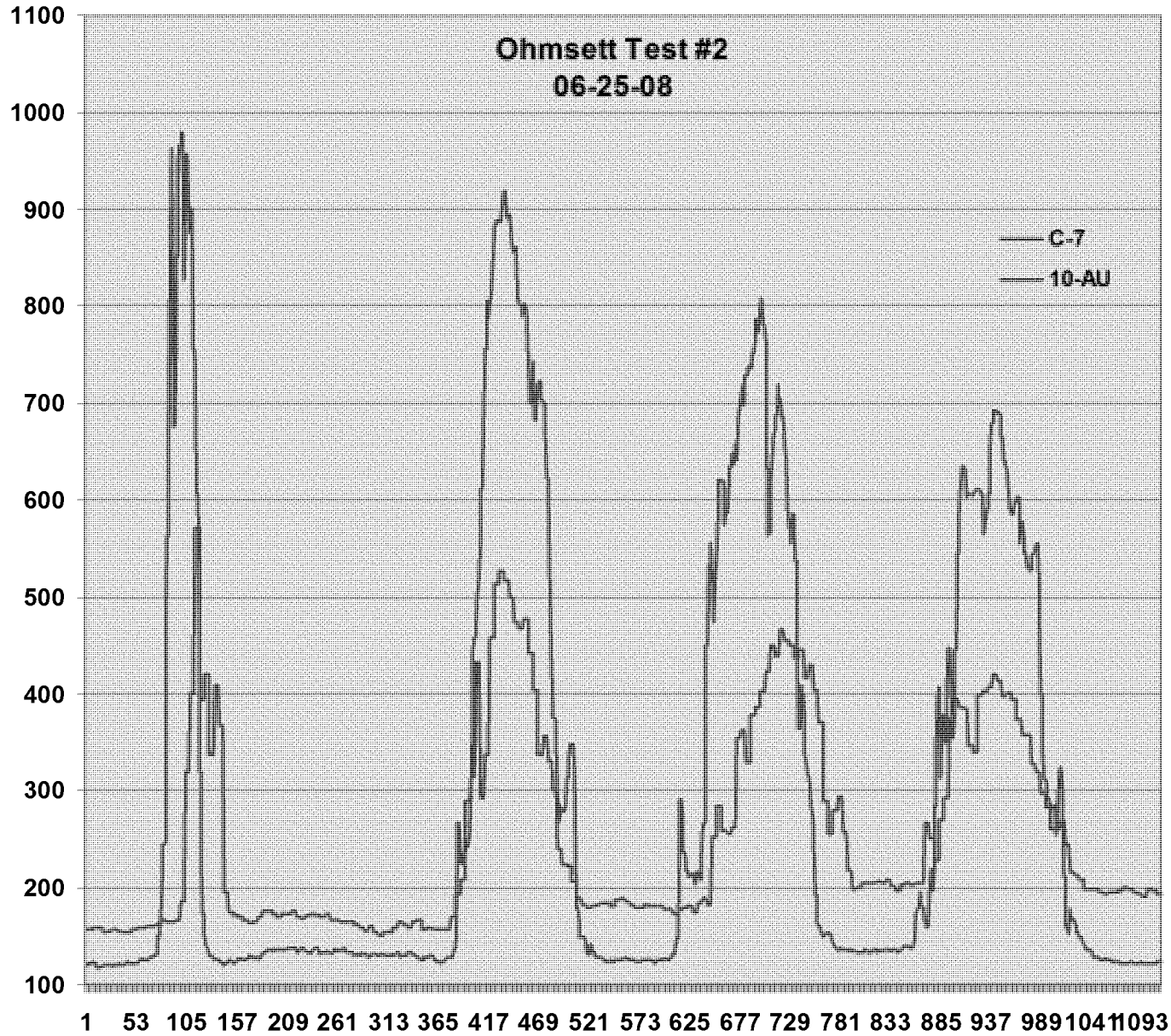




Results of AU-10/Cyclops Comparison at OHMSETT June 2008

Brian Parscal <brian@cleanislands.org>

- Two tests were conducted on June 25th.
- The 10-AU was calibrated according SMART protocol standards while the C-7 was set to collect raw data on the medium gain setting. That most likely explains the difference in amplitude between the two.
- The C-7 (Cyclops) can detect dissolved oil in sea water and considering its ease of use, may be a good candidate for the SMART program.

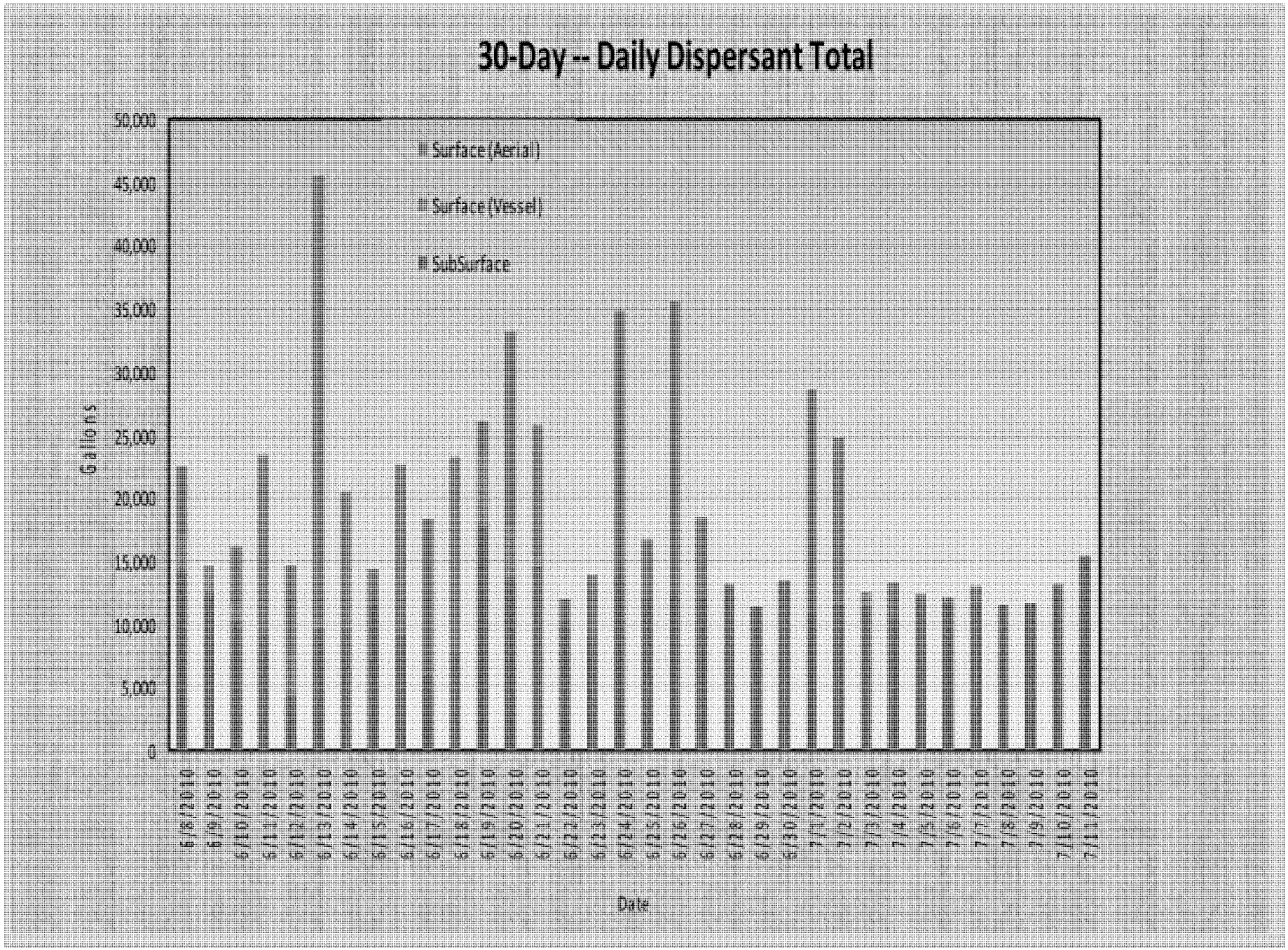

Ohmsett Test #2
06-25-08
C-7
10-AU
1100
1000
900
800
700
600
500
400
300
200
100
1
53
105
157
209
261
313
365
417
469
521
573
625
677
729
781
833
885
937
989
1041
1093

Pros and Cons of Tier 2

- Fluorometry using a fixed wavelength is useful since it responds well to the dispersant concentration.
- Dispersed oil concentration and droplet size distribution is a very good indicator of dispersion effectiveness.
- Fluorometry cannot determine how the oil fingerprint is changing and what oil fractions actually are being dispersed; multiple emission wavelengths would be a better indicator of dispersed fractions.
- Small droplet size (<70 microns on nm) indicates good dispersion, and research indicates very fine (20 nm) particles are a strong indicator of chemical dispersion at moderate turbulence.
- Under the turbulent conditions of an expanding HC gas release at 152 atm, a stable emulsion might be generated mechanically.

Surface Dispersant Application at the Deepwater Horizon

- Per RRT guidance application occurs >3 miles offshore and water depth of > 10 meters
- Applied primarily via aircraft
- As of 07/12/10
  - 404 sorties flown
  - 975,038 gallons sprayed
  - 305 sq miles covered (195,008 acres)


30-Day -- Daily Dispersant Total
50,000
45,000
40,000
35,000
30,000
25,000
20,000
15,000
10,000
5,000
0
Gallons
Surface (Aerial)
Surface (Vessel)
SubSurface
6/8/2010
6/9/2010
6/10/2010
6/11/2010
6/12/2010
6/13/2010
6/14/2010
6/15/2010
6/16/2010
6/17/2010
6/18/2010
6/19/2010
6/20/2010
6/21/2010
6/22/2010
6/23/2010
6/24/2010
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6/29/2010
6/30/2010
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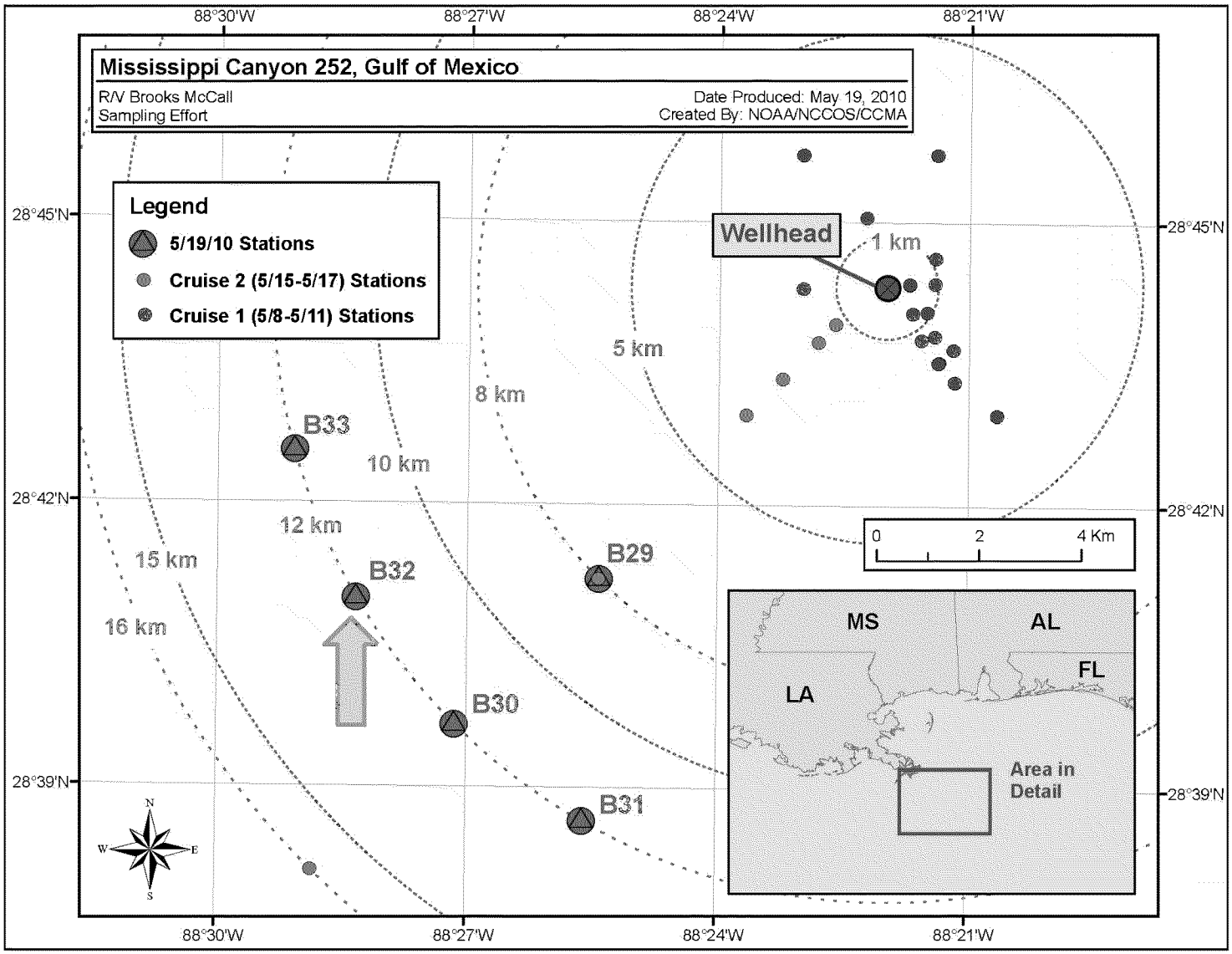
7/11/2010
Date

Field Application
DWH Oil Spill
Brooks-McCall Cruise
May 19, 2011

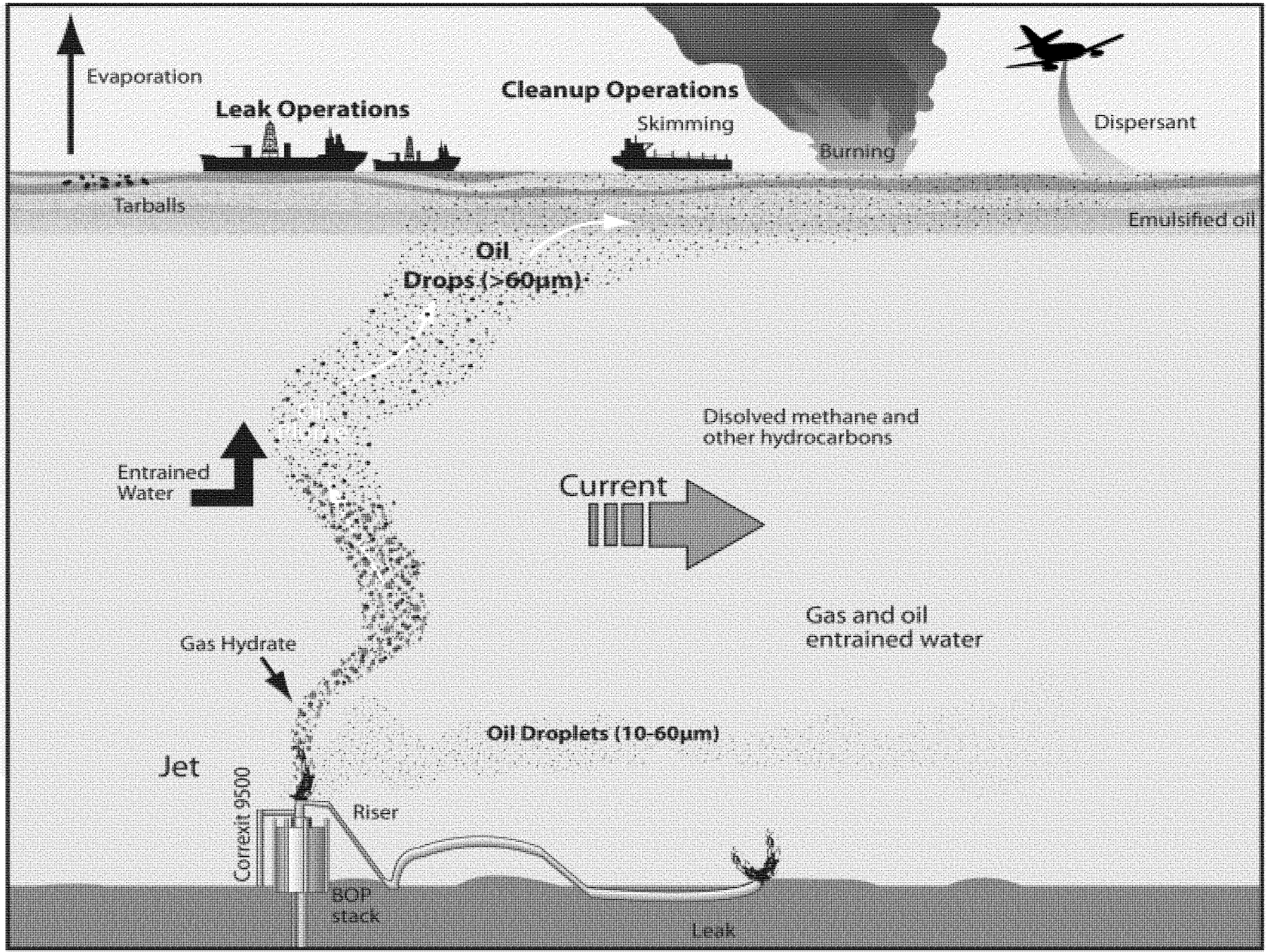
Conductivity, Temperature, Density (CDT) Data plus Fluorometry Traces

Sampling Locations

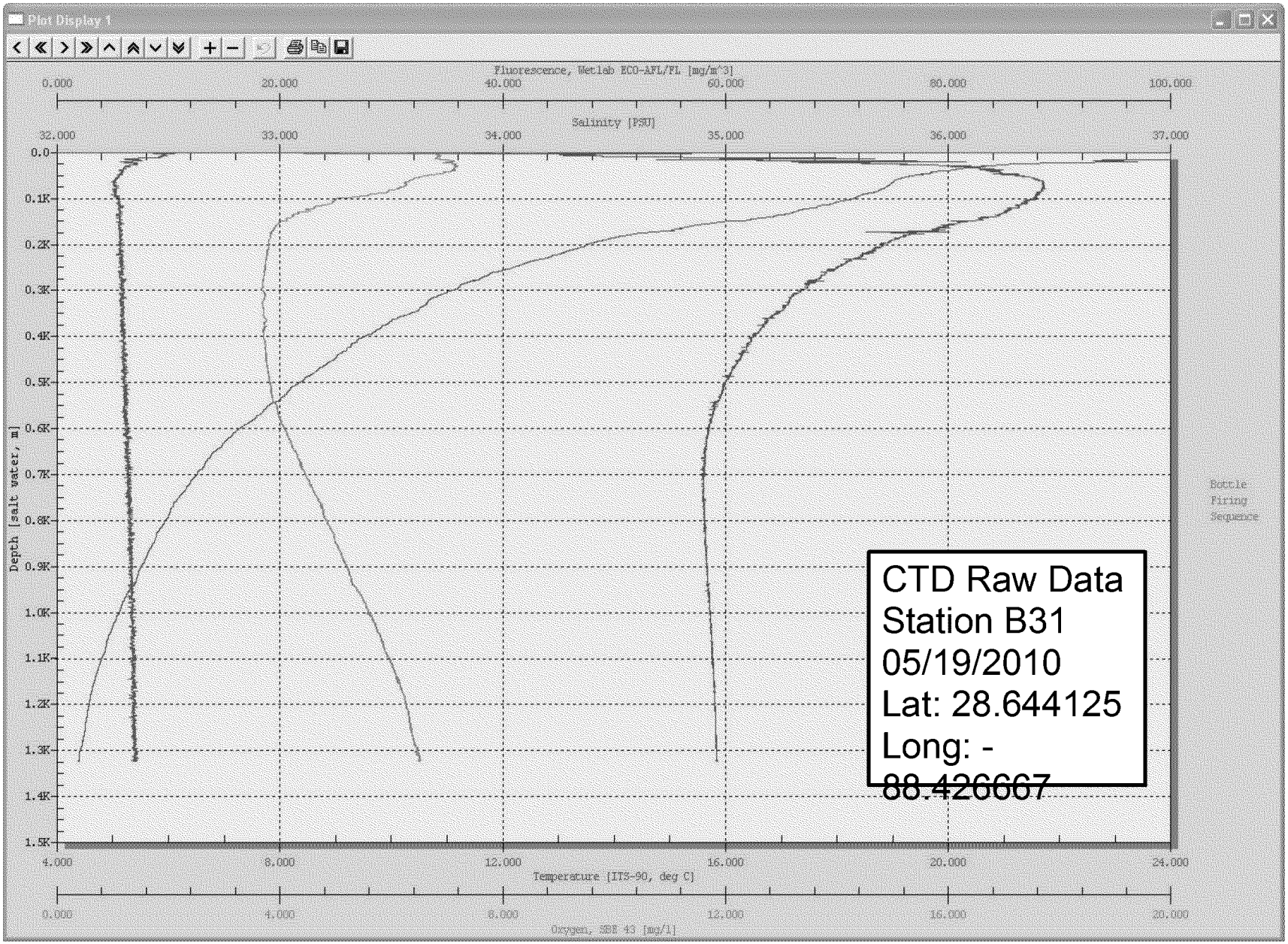


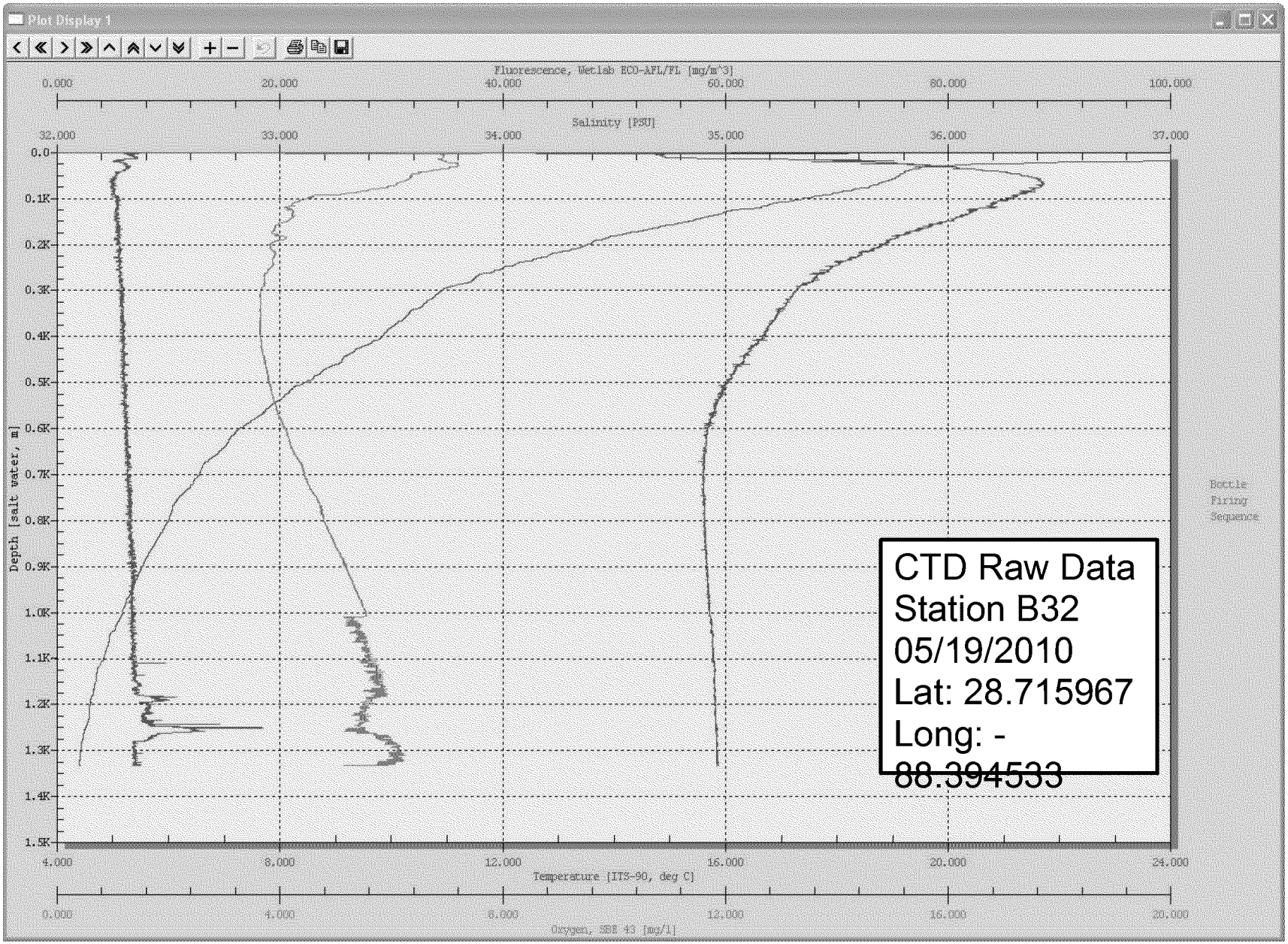
On-Board Fluorometry

- Two fixed wavelength UV fluorometers were employed in tandem to determine Fluorescence Intensity Ratios (FIRs).
- One fluorometer was equipped with a pair of wavelength filters allowing excitation at 280 nm and emission at 340 nm.
- The second fluorometer was equipped with the same 280 nm excitation filter and a longer (445 nm) wavelength.
- FIRs were then calculated from fluorescence intensity at 340 nm divided by intensity at 445 nm.



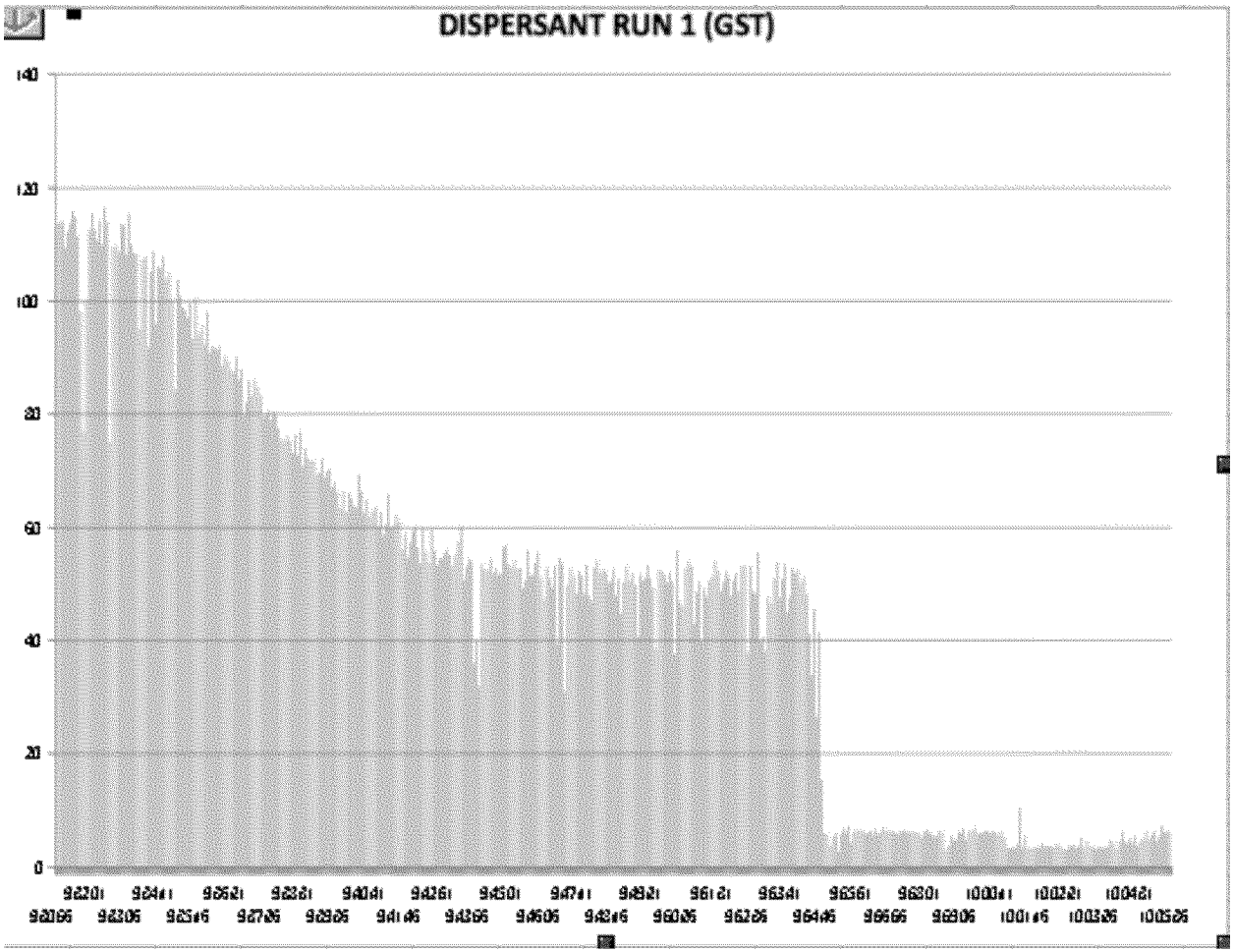
ED_001324_00008431-00035


Plot Display 1
Fluorescence, Wetlab ECO-AFL/FL [mg/m^3]
0.000
20.000
40.000
60.000
80.000
100.000
Salinity [PSU]
32.000
33.000
34.000
35.000
36.000
37.000
Depth [salt water, m]
0.0
0.1K
0.2K
0.3K
0.4K
0.5K
0.6K
0.7K
0.8K
0.9K
1.0K
1.1K
1.2K
1.3K
1.4K
1.5K
Bottle Firing Sequence
CTD Raw Data
Station B31
05/19/2010
Lat: 28.644125
Long: -88.426667
4.000
8.000
12.000
16.000
20.000
24.000
Temperature [ITS-90, deg C]
0.000
4.000
8.000
12.000
16.000
20.000
Oxygen, SBE 43 [mg/l]

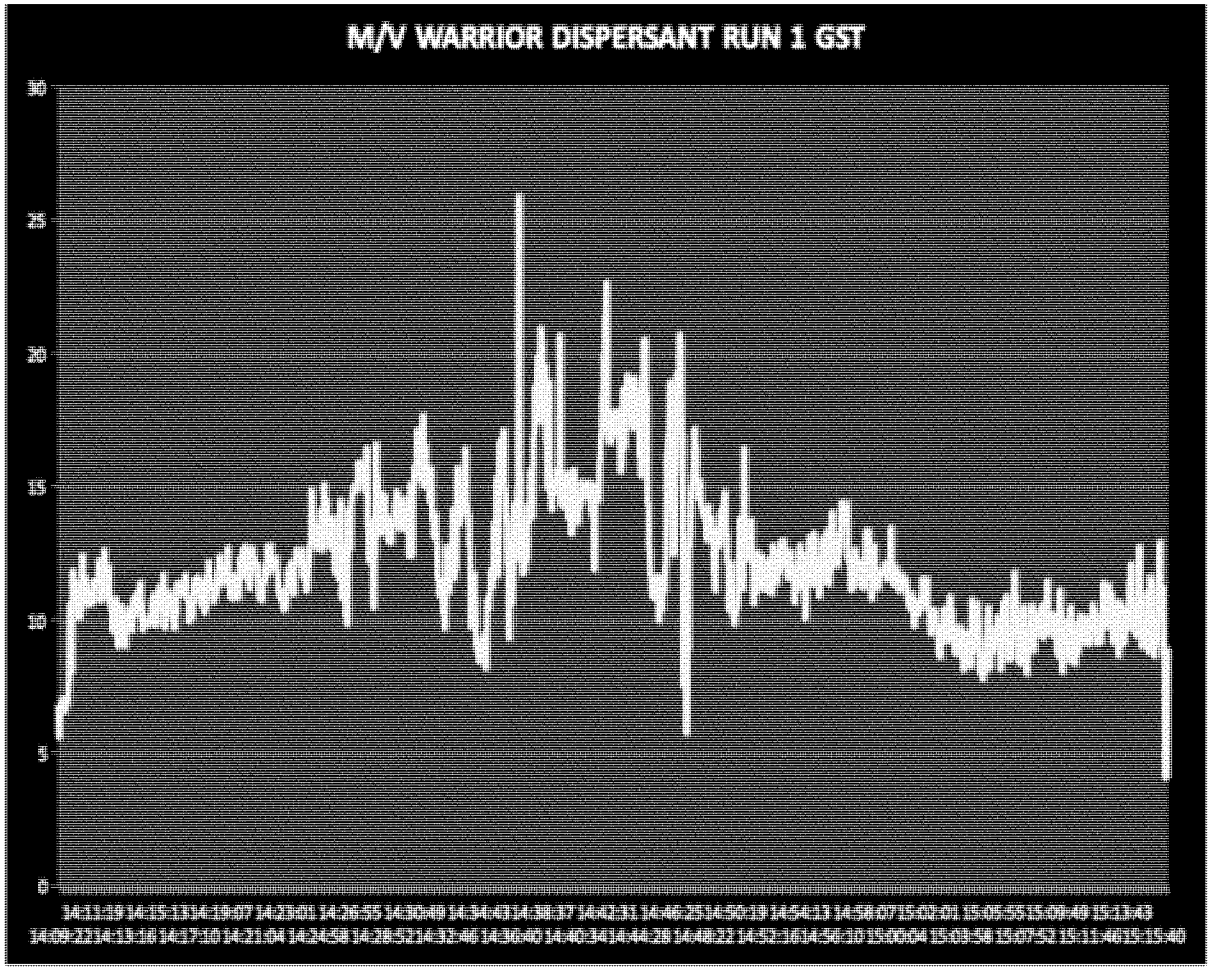

Plot Display 1
Fluorescence, Wetlab ECO-AFL/FL [mg/m^3]
0.000
20.000
40.000
60.000
80.000
100.000
Salinity [PSU]
32.000
33.000
34.000
35.000
36.000
37.000
Depth [salt water, m]
0.0
0.1K
0.2K
0.3K
0.4K
0.5K
0.6K
0.7K
0.8K
0.9K
1.0K
1.1K
1.2K
1.3K
1.4K
1.5K
Bottle Firing Sequence
CTD Raw Data
Station B32
05/19/2010
Lat: 28.715967
Long: -88.394533
4.000
8.000
12.000
16.000
20.000
24.000
Temperature [ITS-90, deg C]
0.000
4.000
8.000
12.000
16.000
20.000
Oxygen, SBE 43 [mg/l]

SMART Tier 2
Monitoring of Surface Application of Dispersant

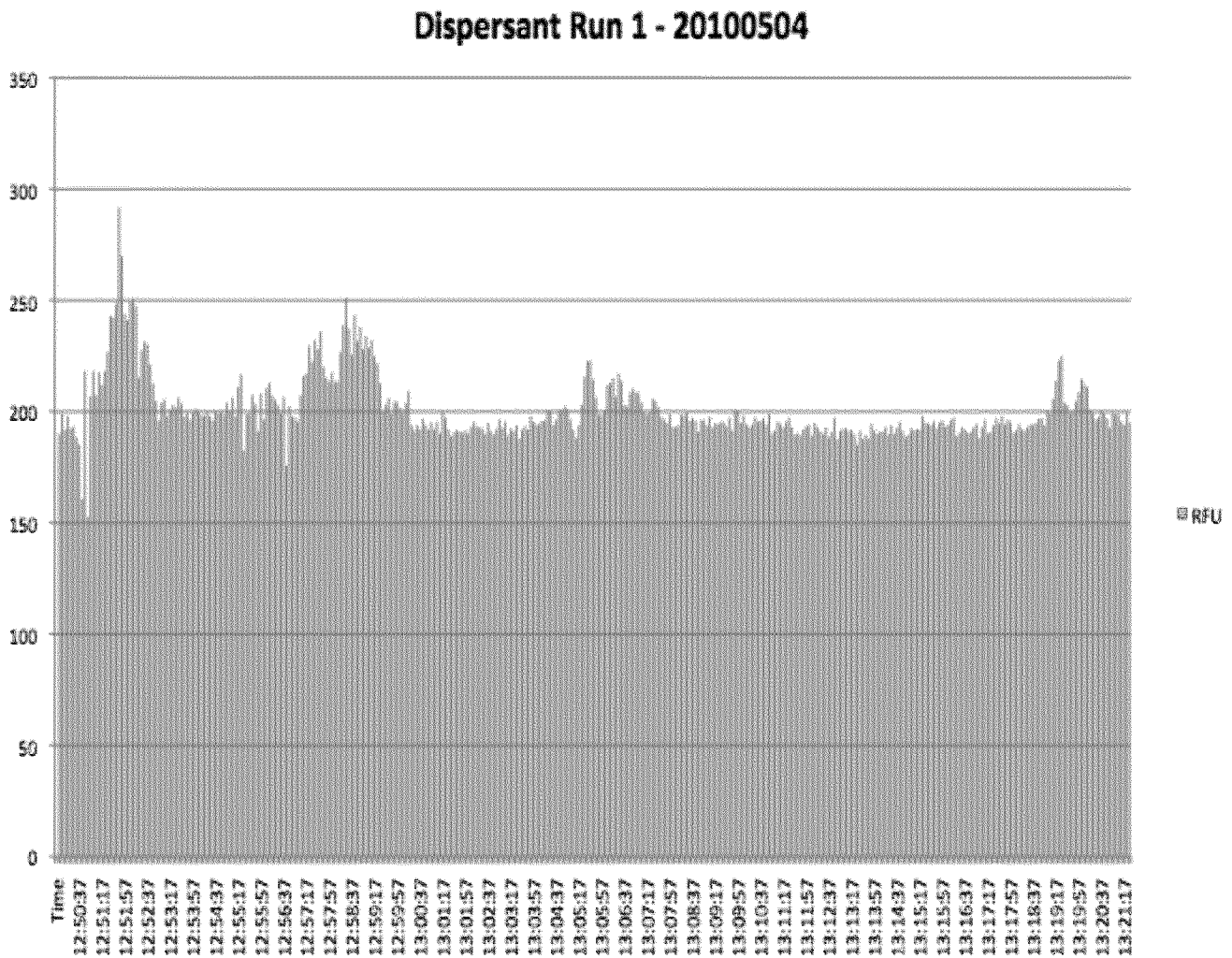
- A set of results was submitted to the HQ Science Group for assessment.
- The following 5 figures were used by EPA to determine that surface application of dispersant was not effective.
- The 6th figure is a good example of a fluorometry trace which compares mechanical and chemical dispersion near the surface.



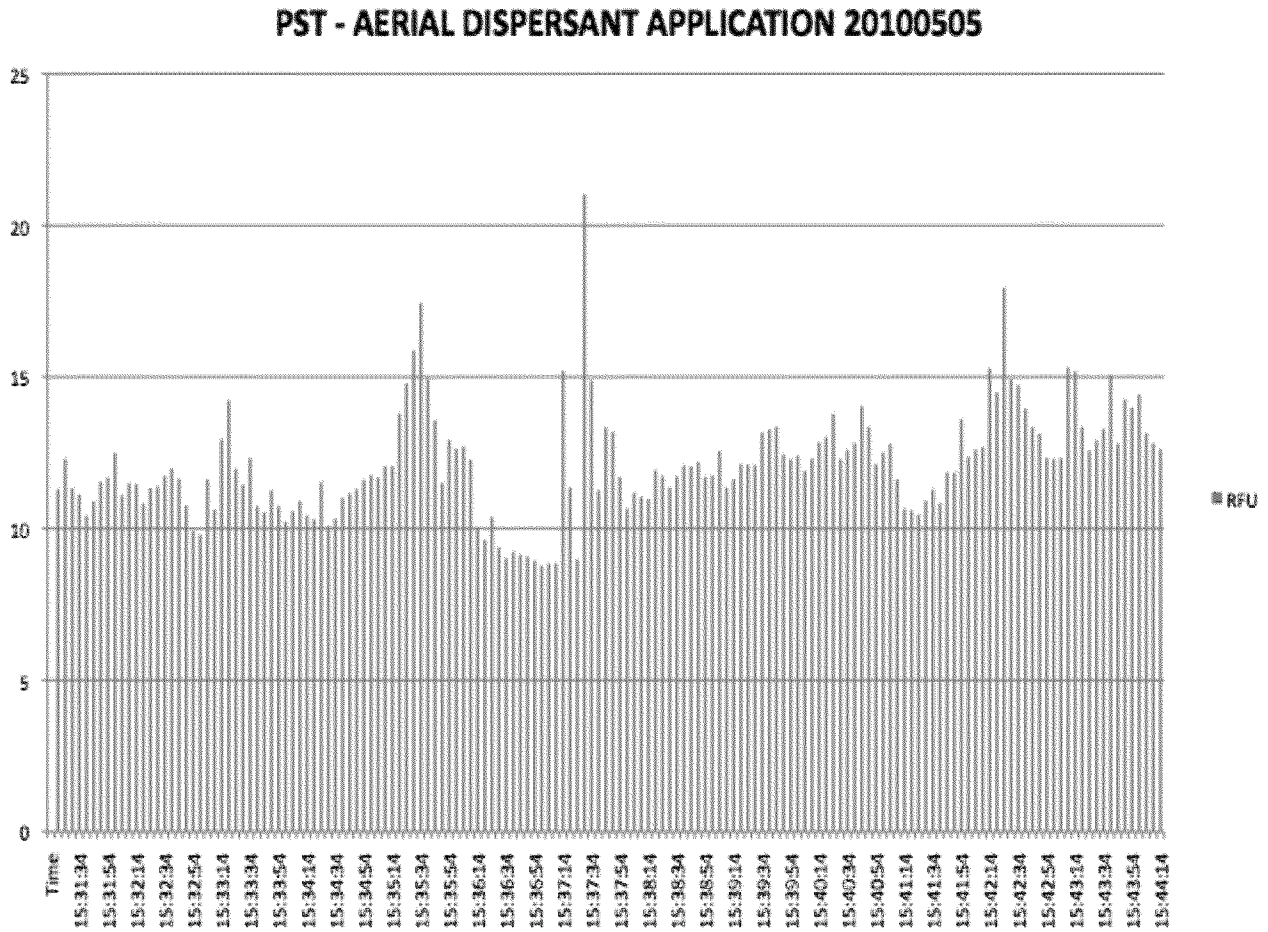
Increase of Fluorometry Reading >10x
(Almost 30x at Mid-plume)
Successful Application 4/28/2010



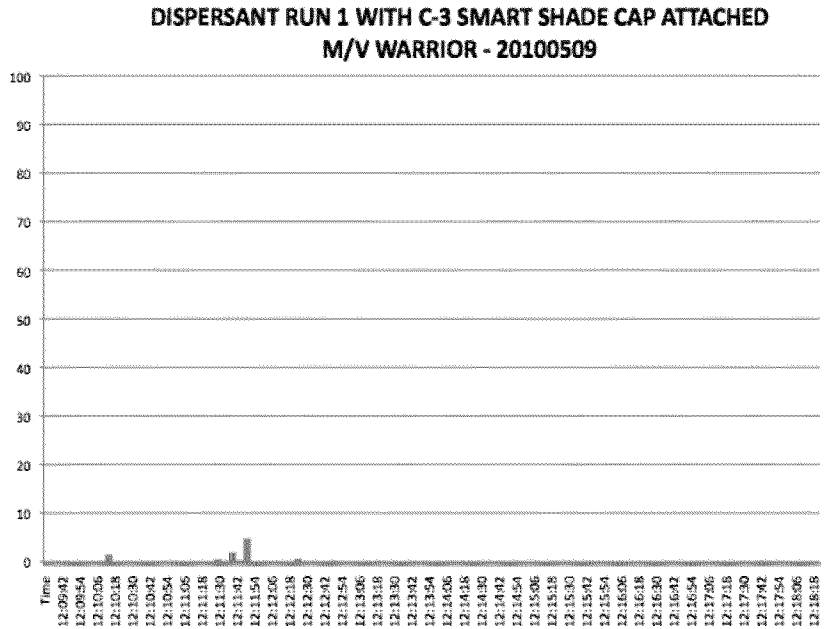
Unsuccessful Dispersant Application 4/28/2010



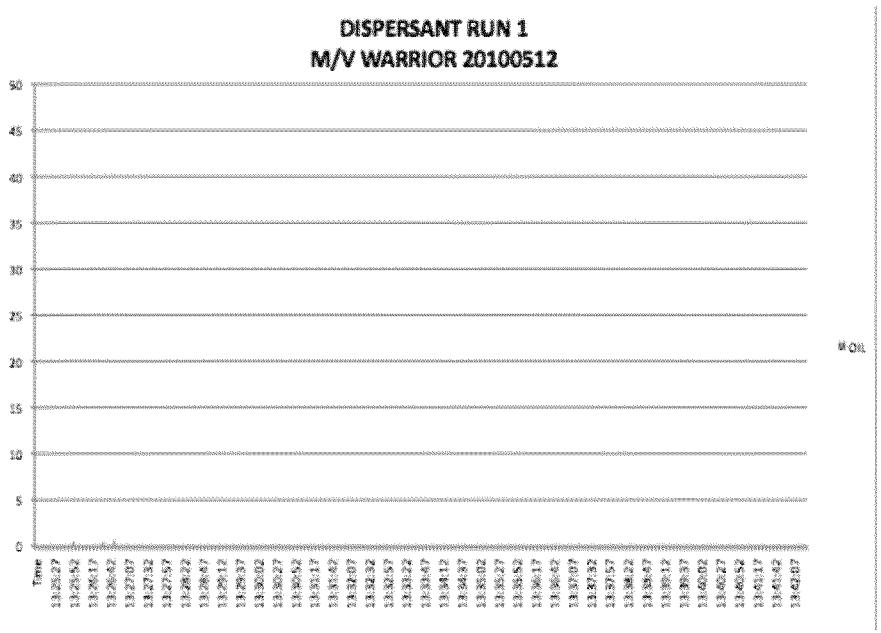
Unsuccessful Dispersant Application 5/4/2010

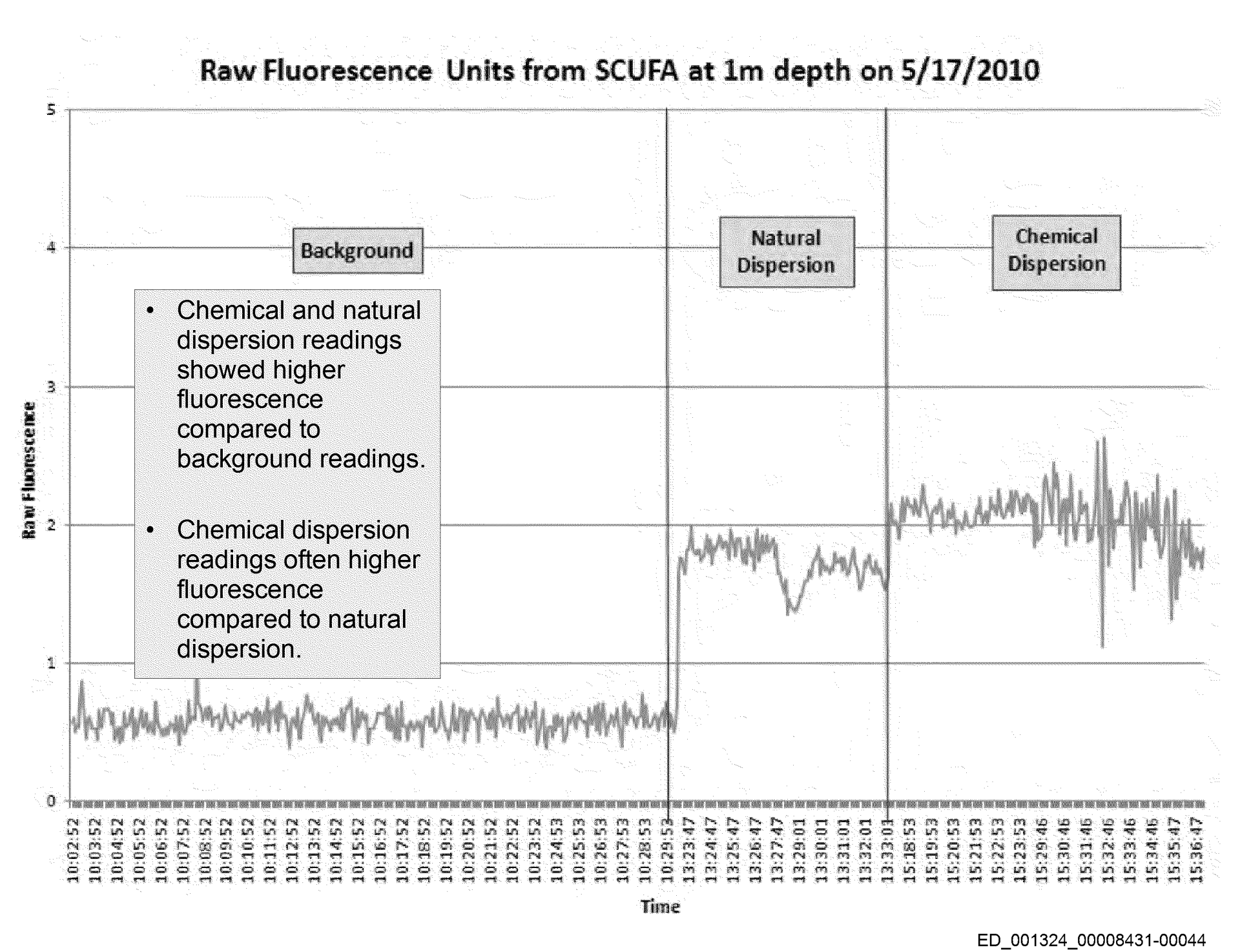


Unsuccessful Dispersant Application 5/5/2010



Incomplete Fluorometry Data Runs of 5/9-10/2010




Raw Fluorescence Units from SCUFA at 1m depth on 5/17/2010
Background
Natural Dispersion
Chemical Dispersion
• Chemical and natural dispersion readings showed higher fluorescence compared to background readings.
• Chemical dispersion readings often higher fluorescence compared to natural dispersion.
Raw Fluorescence
Time

So now we can judge for ourselves as to the "effectiveness" of dispersant application.

- How effective was the dispersant in removing the oil from the environment?
- How effective was the dispersant in reducing the environmental impact?
- In other words, where is the rest of the oil and dispersant and what kind of toxic residuals can we expect?

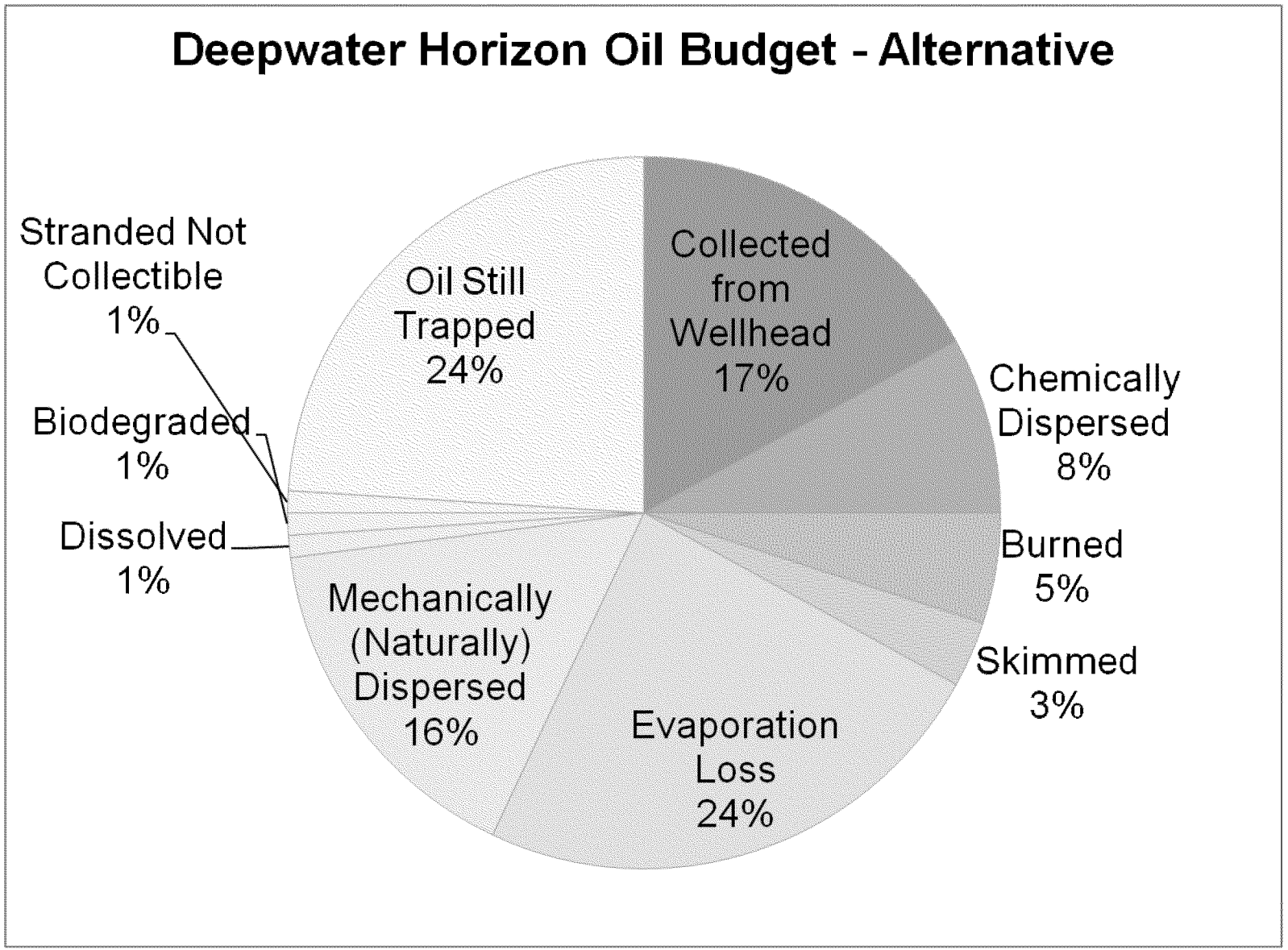
Deepwater Horizon Oil Budget Quantities

ERT Edition of NOAA/USGS Budget

	Fraction	MG
Collected from Wellhead	0.17	35.0
Chemically Dispersed	**0.08**	**16.5**
Burned	0.05	10.3
Skimmed	0.03	6.2
Evaporation Loss	0.24	49.4
Mechanically (Naturally) Dispersed	**0.16**	**32.9**
Dissolved	0.01	**2.1**
Biodegraded	0.01	2.1
Stranded Not Collectible	**0.01**	**2.1**
Oil Still Trapped	**0.24**	**49.4**
Residual Still in the Gulf System	0.50	**100.8**

Actually, a 25% recovery is remarkable, and if we count the 8% chemically dispersed, 33% mitigation is quite a feat!!

Modified Oil Budget



So why go to SMART Tier 3 and sample?

- The EPA and the Natural Resource Trustees need to be concerned with the oil spill impacts which are not caused by the “coating effect” of the oil itself.
- During the turbulence of many spills, including mixing from wind and wave action, oil can be dispersed mechanically, and soluble components of oil can partition into the water column.
- The EPA and the Natural Resource Trustees need to be concerned with the oil spill impacts which are not caused by the “coating effect” of the oil itself.
- This involves chemical analysis, which triggers the need for SMART Tier 3.

- The Canadians and EPA's ORD have taught us that the lighter and more soluble oil components are more easily dispersed chemically. These are also the more toxic and biodegradable components, thus these are the most likely to cause environmental impact. In a localized or confined area, concentrations could build up and either toxicity, oxygen deficiency, or both could exert undesirable effects.
- Biodegradation potential of the suspended and dispersed residual oil and dispersant is also related to the chemical components, rather than on the broad categories of petroleum hydrocarbons or fluorescible organics.

- The NOAA SQuIRTs anticipate these problems and provide parameters and analytical method citations to address them. Many of the chemicals listed do not relate to oil spills, but some refer to the volatile and semivolatile components of crude and refined products.

- Since different oils have different relative concentrations of these fractions, assessing the environmental risk from the dispersible fraction requires that we either know what is in the originally-spilled oil or measure the byproducts in solution or suspension. The Environment Canada Catalog of Oil Properties can help predict this fraction.

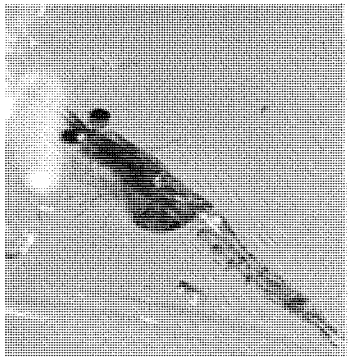
- National Academy of Sciences' 1972 Blue Book is still useful for water quality criteria relative to oil spills.

SQuiRTs are for NOAA Hazmat screening-level use, but…

- Screening levels are based on EPA's Water Quality Criteria for acute exposure (highest 1 hour average, not to exceed once every 3 years). (This is effectively a grab sample.)
- For Semivolatile PAH, the concentration ranges between 7.7 and 3,980 ppb (ug/L)
- For Volatile Aromatics (BTEX) ranges between 530 to32,000 ppb.
- For Total Petroleum Hydrocarbons, there is no SQuiRT listed, but EPA's Method 8015B (GC/FID) is specified.
- SQuiRTs, are available on NOAA's website:

http://response.restoration.noaa.gov

Results of 48 hour acute toxicity tests of 8 dispersants to the Gulf of Mexico invertebrate, mysid shrimp (*Americamysis bahia*)

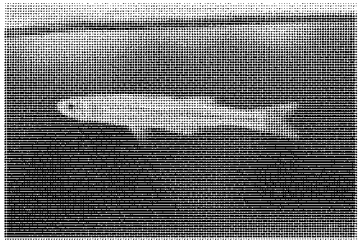


Dispersant	This Study LC50 (ppm) [95% CI]	Toxicity Category	NCP Product Schedule LC50 (ppm) [95% CI]
Dispersit SPC 1000	12 [10-14]	Slightly Toxic	16.6 [14.1-19.6]
Nokomis 3-AA	30 [27-34]	Slightly Toxic	20.2 [17.4-22.8]
Corexit 9500A	**42 [38-47]**	**Slightly Toxic**	**32.2 [26.5-39.2]**
Nokomis 3-F4	42 [38-47]	Slightly Toxic	32.2 [28.4-36.5]
ZI -400	55 [50-61]	Slightly Toxic	21.0 [17.9-24.5]
Sea Brat #4	65 [57-74]	Slightly Toxic	14.0 [±10.4]
Saf-Ron Gold	118 [104-133]	Practically Non-Toxic	63.0* [52.9-75.1]
JD-2000	788 [627-946]	Practically Non-Toxic	90.5* [76.1-108]

* Classified as slightly toxic according to values provided in NCP Product Schedule

http://www.epa.gov/bpspill/dispersants-testing.html

Results of 96 hour acute toxicity tests of 8 dispersants to the Gulf of Mexico fish, inland silverside (*Menidia beryllina)*



Dispersant	This Study LC50 (ppm) [95% CI]	Toxicity Category	NCP Product Schedule LC50 (ppm) [95% CI]
Dispersit SPC 1000	2.9 [2.5-3.2]	Moderately Toxic	3.5 [3.1-4.0]
Nokomis 3-F4	19 [16-21]	Slightly Toxic	29.8 [24.0-35.4]
Nokomis 3-AA	19 [17-21]	Slightly Toxic	34.2 [29.2-37.95]
ZI -400	21 [18-23]	Slightly Toxic	31.8 [28.7-35.1]
Saf-Ron Gold	44 [41-47]	Slightly Toxic	29.4 [25.2-34.3]
Sea Brat #4	55 [49-62]	Slightly Toxic	30.0 [±16.2]
Corexit 9500A	**130 [122-138]**	**Practically Non-Toxic**	**25.2* [13.6-46.6]**
JD-2000	>5,600	Practically Non-Toxic	407 [330-501]

* Classified as slightly toxic according to values provided in NCP Product Schedule

http://www.epa.gov/bpspill/dispersants-testing.html

SMARTer

- It is important to remember that in the rapidly changing conditions of spill response, flexibility and adaptability are essential for success. The sampling plan is dictated by many factors, including the availability of equipment and personnel, on-scene conditions, and the window of opportunity for dispersant application.
- The need for flexibility in sampling design, effort, and rapid deployment may dictate the nature and extent of the monitoring.
- To assist the monitoring efforts, it is important that the Unified Command agrees on the goals and objectives of monitoring and chooses the appropriate level of effort for the response.

SMART Sampling and Analysis for Dispersant Application – A Final Message from the Old Timers

- Ken Biglane, the architect of the NCP and ERT, once said “I trust the oil I can see more than the oil I can't see.”
- Dr. Joseph P. Lafornara, 12/10/2003, quoted Ken and remarked on the Need for a National Dispersant Use Policy.
- The BP Deepwater Horizon Response showed that this policy is still needed.
- SMART performance data will be needed to craft a rational policy.

Contact Information

- Allen.Harry@epa.gov
- www.epaosc.org/SMARTOSC/
- 732-321-6740 (ERT Main Number)
- 732-321-6660 (ERT Hotline)

To: Robyn Conmy[Conmy.Robyn@epa.gov]
From: Wilson, Gregory
Sent: Wed 5/13/2015 5:37:38 PM
Subject: FW: IMO Subsea Dispersant Table of Contents (Outline)
IMO Subsea Dispersant Domestic Team Meeting Agenda_13May2015.docx
Subsea Dispersant GPG_17 April 2015.pdf
IMO-Manual.pdf
IMO_Document_Template-rev1.2012[1].docx

fyi

From: Aten, Brandon J LT [mailto:Brandon.J.Aten@uscg.mil]
Sent: Wednesday, May 13, 2015 1:32 PM
To: 'john.caplis@bsee.gov'; 'timothy.steffek@bsee.gov'; 'carl.childs@noaa.gov'; michael.k.sams@uscg.mil; Lundgren, Scott; Faulkner, Mike; Principe, Vanessa; Tulis, Dana; Matthiessen, Craig; Wilson, Gregory; DeHaven, Leigh; Jozsef, Aaron L LT; brwalker@fs.fed.us
Subject: IMO Subsea Dispersant Table of Contents (Outline)

(Switch to HTML)

Good afternoon,

Agenda is attached. The call-in number is on the agenda and below. I had some issues with utilizing the drop-box tool for the references last night, but should have it rectified soon. With that said, attached is a new reference from IPIECA which should be useful for multiple sections.

To facilitate the discussion this afternoon, below is a draft outline of the subsea dispersant topic with some initial ideas of topic leads for each section. Knowing that each of you have expertise in each subject, the outline below is open to whichever section(s) you feel you could best contribute. The meeting will be relatively short as we are only looking for section leads at this point with an understanding that section titles/topics may change as more thought is poured into each section.

1. Intro (**LT Aten, Mr. Lundgren**)

•□□□□□□□ Describe the role of subsea dispersion within the overall strategy of a response to a subsea oil release.

2. Role in Response Strategies/Conditions for Use **(EPA / NOAA / USCG)**

•□□□□□□□ Advantages/disadvantages/conditions when Sub Sea dispersion is advisable as opposed or in addition to other response strategies? Would it include discussion of physical/chemical/mechanism of action?

•□□□□□□□ General discussion of the advantages and disadvantages of using subsea dispersants, and under what type of conditions it might be a suitable response option to implement

3. Decision-Making Procedures **(EPA / USCG / NOAA / BSEE)?**

•□□□□□□□ Tradeoff assessment considered to inform the determination to use this strategy, and as part of the authorization request process? Not sure that "conditions of use" would not be part of the authorization process, which I understand would establish use parameters on a case-by-case basis.

•□□□□□□□ There could be a discussion on the concepts involved with the process of decision-making and approval, including pre-incident planning, decision-making for initial dispersant usage, and for continued day-to-day operational decision-making as new information is presented (ie results of monitoring, etc). I would mention NEBA as a process that should be used to inform decision-making at all three steps, but I would not try to address the details of the various conditions that would be considered in the NEBA (probably too much detail).

4. Operations **(BSEE / USCG)**

•□□□□□□□ Describe the main features of the various specialized equipment available in the

world today as well as the logistical requirements related to mobilization and deployment of this equipment;

5. Monitoring **(EPA / USDA / NOAA / BSEE)**

•□□□□□□□□ Describe methodologies for operational monitoring and control of a subsea dispersion operation;

6. Fate and Effects? (EPA / NOAA / USDA)

7. Data and Information Management **(USCG / EPA)**

•□□□□□□□□ Internal and external communications

Number: (877) 950-0401

Participant code: 5627627

Very Respectfully,

LT Brandon Aten

USCG, MER-1

W: 202-372-2248

C: 860-514-4581

Brandon.J.Aten@uscg.mil

IMO SUBSEA DISPERSANT CHAPTER DEVELOPMENT MEETING

TELECONFERENCE AGENDA

WEDNESDAY, MAY 13TH, 2015
1500 – 1530 (EASTERN)

NUMBER: (877) 950-0401
PARTICIPANT CODE: 5627627
ROOM: 6T06-02 (CGHQ)

I. Kick Off and Roll Call – LT Brandon Aten (1500)

II. Mr. Lundgren Opening Remarks – (1505)

III. IMO Subsea Dispersant Chapter Assignments (1505-1520)
- **Review Current Outline**
- **Assign team members to appropriate chapters**
- **IMO writing/stylistic expectations**

IV. Schedule Next Meeting and Closing Comments (1525-1530)
- In Progress Review Meeting: Wednesday, June 3rd at 1500-1530 (Eastern)

Type the Committee/Sub committee name.
Type the Session no. session
Agenda item Type the agenda item no.

Type the Document symbol
20 July 2012
Original: ENGLISH

TYPE AGENDA TITLE IN ALL CAPS

Type Document Title

Submitted by [enter country[ies]]

SUMMARY

Executive summary:
Strategic direction:
High-level action:
Planned output:
Action to be taken: Paragraph
Related documents:

USE ARIAL SIZE 11, FORMAT TO A4 SIZE PAPER, 1" MARGINS, and use spell/grammar check prior to routing to CG-52

Introduction

1 This document is submitted in accordance with the provisions of paragraph 4.10.5 of the Guidelines on the organization and method of work of the Committees and their subsidiary bodies (MSC-MEPC.1/Circ.2). [text]

Discussion

2 [Text]

3 While some delegations shared the view of the United States, many delegations supported the proposal put forward by Australia and SPREP, and the Committee approved the draft amendments as proposed in MEPC 62/7 for circulation, with a view to adoption at MEPC 63. The United States reserved its position with regard to the decision to circulate the proposed amendments, and with respect to the limitation to Small Island Developing States.

.1 [text]

.2 [text]

.1.1 [text]

.1.2 [text]

Action requested of the [Sub-Committee/Committee]

4 The Committee is invited to consider the comments and proposals provided in this document and take action as appropriate.

***